Situation awareness in mixed realities

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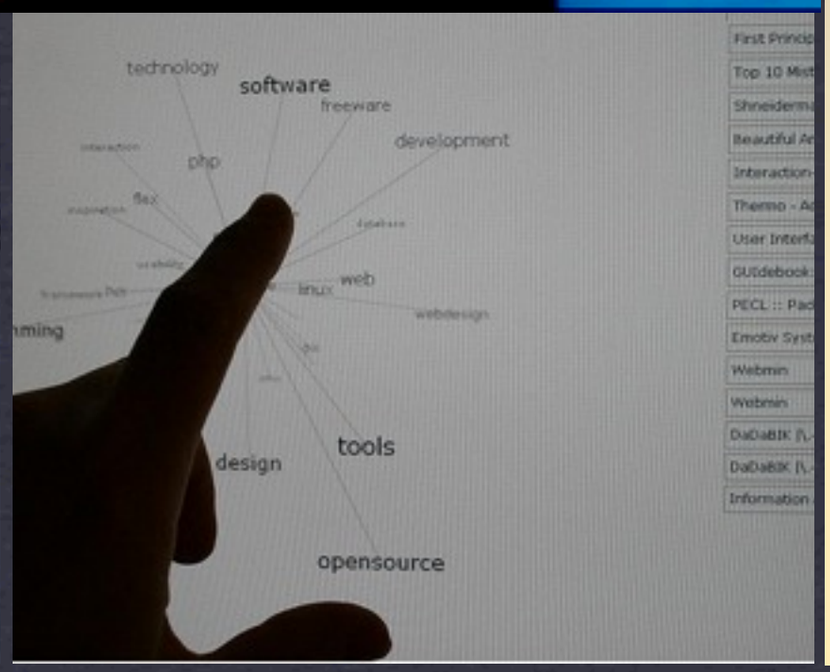
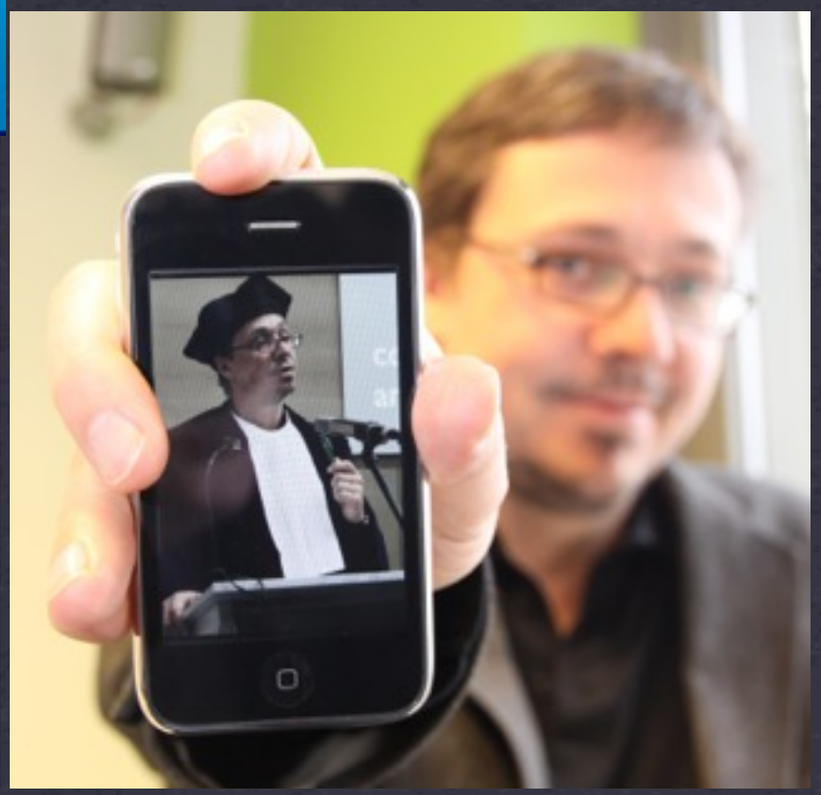
thanks to Dr. Christian Glahn, Dominique Verpoorten,
Dirk Boerner, Stefaan Ternier, Marco Kalz



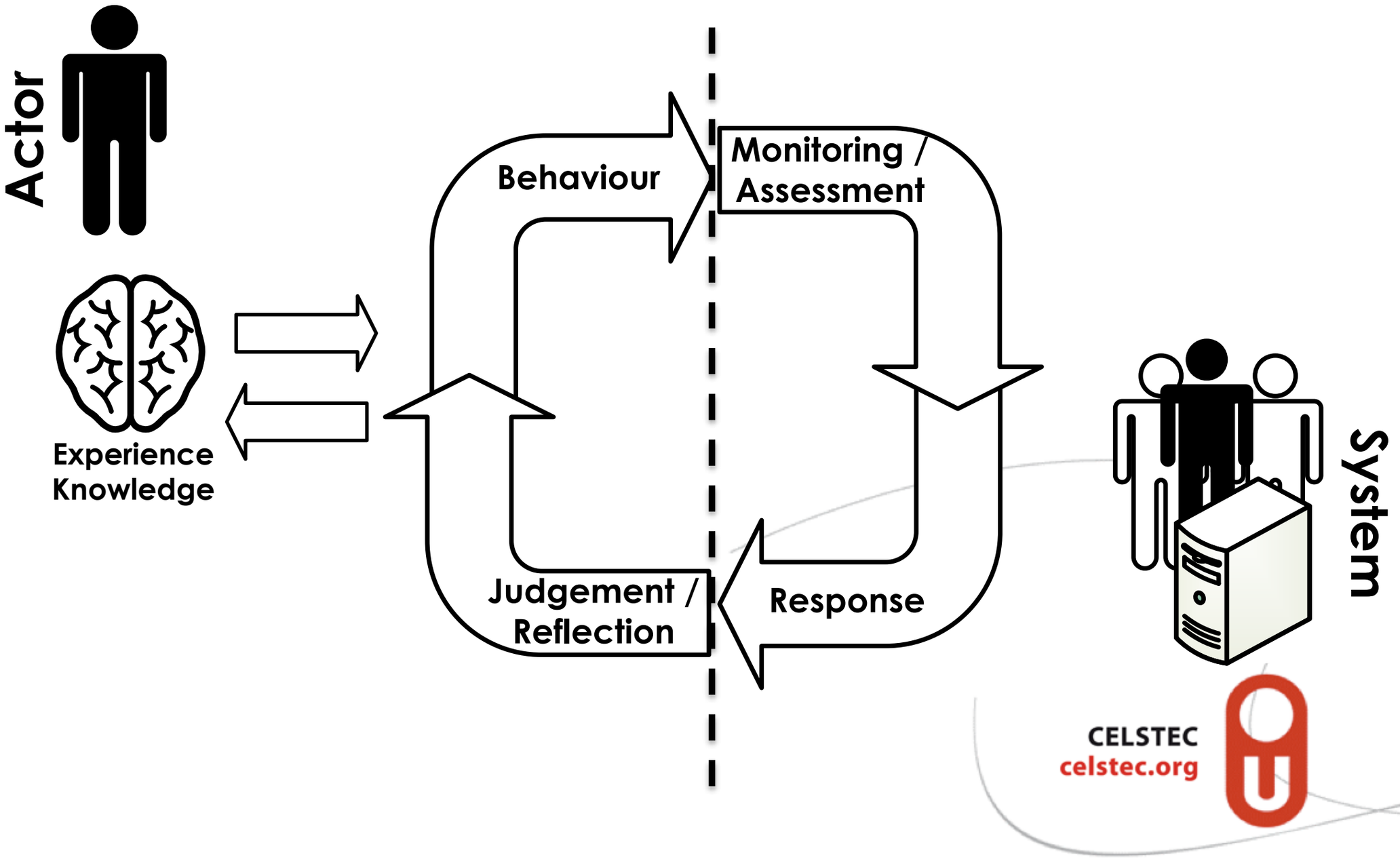


2005 OPEN UNIVERSITEIT, LEARNING MEDIA LAB, DEVELOPMENTS, MOBILE, IMMERSIVE, SOCIAL MEDIA

Feedback Loops and Situational Awareness

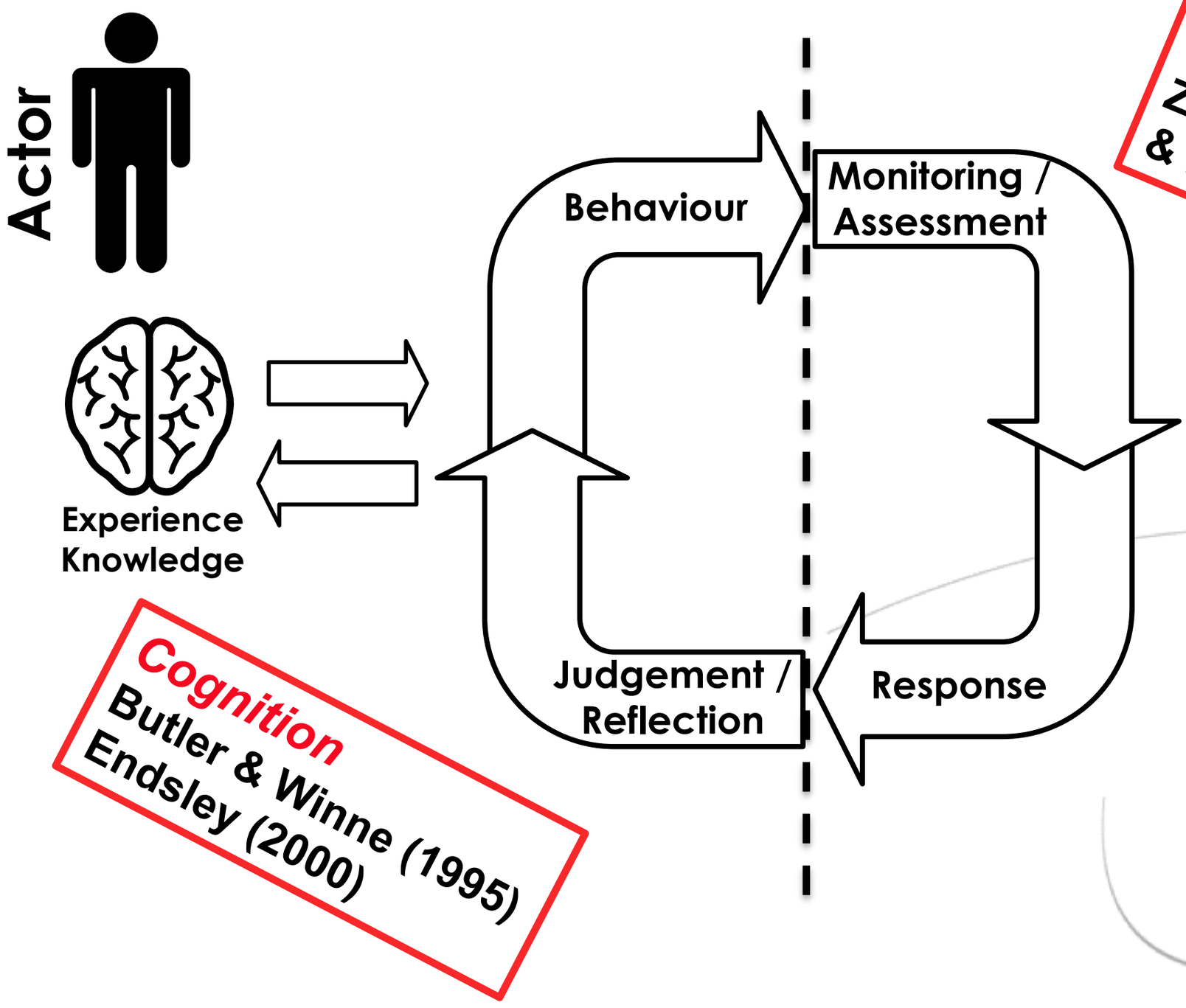
Usually I present this simplified

Feedback Loop



It integrates

Models for designing Technologies for learning



Technologies
Zimmermann, Specht, & Lorenz (2005)

Cognition
Butler & Winne (1995)
Endsley (2000)

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#display technology can create feedback loops...

Goetz, T. (2011). Harnessing the Power of Feedback Loops | Magazine. *wired.com*. Retrieved August 22, 2011, from http://www.wired.com/magazine/2011/06/ff_feedbackloop/5/

Levels of Situation Awareness

- Level 1: Perception of relevant information
  - Being able to identify a situation

- Level 2: Comprehension of information
  - Understand the situation in context

- Level 3: Forward prediction
  - Understand the dynamics of a context

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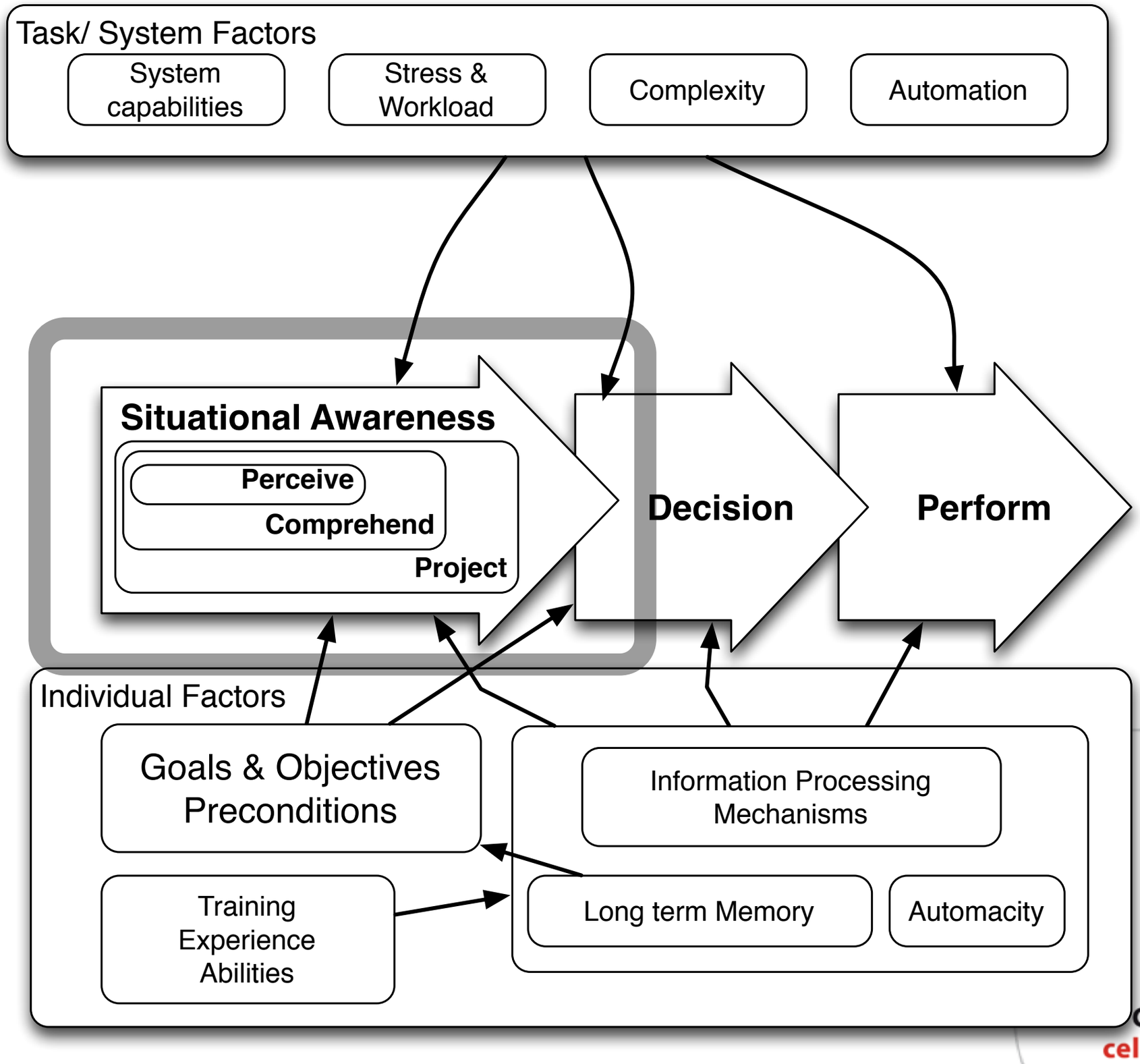

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Situation Awareness in Teams

- Self-awareness within the team
- Peer-awareness within the team
- Awareness of the team as a whole
- Resource-awareness within the team

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System resolution

SSA Maturity levels

	Individual	Team/Group	System
Participation	**Flexibility** to adapt and respond to unexpected situations [11]	**Synergy** is a key ingredient for cooperative joint actions in dynamic environments [14]	**Innovation** in processes, operations and technologies is essential to competitive. The system needs to be collectively innovative to deal with complex situations [19]
Prescription	**Compliance** to planning is crucial to prevent deviations that could affect others in the system. The gap between what an individual perceives and what he/she does needs to be reduced [1]	**Coordination** is one of the key team processes required to create team SA [23]	**Network governance** to monitor each others' plans and actions, the system direction and to create a sense of communality and shared destiny [21], [25] & [9] in [24]
Perception	**Goal orientation** for individual goal setting [10]	**Team goal orientation** for awareness of processes towards shared goal setting	**Positioning** of a high level goal needs to be broad to allow negotiation, as well as steer the system in a direction [4]

Reflection and Self-regulated learning

People reflect in order to learn.

The font size on this slide is 84. The font type is Gill Sans.

The absolute size of the screen is ....

effects of reflection

- Meta-analyses enduringly rank reflective practice amongst the strongest levers for learning (Hattie, 2009; Higgins, Kokotsaki, & Coe, 2011; Marzano, 1998; Wang, Haertel, & Walberg, 1990).
- reflection is not just an "add-on" to instruction, but an essential component of a deep approach to learning (Marton, Dall'Alba, & Beaty, 1993).

reflection amplifiers

- The confluence of experience (action) and thought (reflection) creates learning (e.g. Kolb, 1984 or Freire, 1973). Learning is both an active and a reflective process.
- Reflection amplifiers are aids designed to prompt and support clear and concise thought embedded within the process of learning.

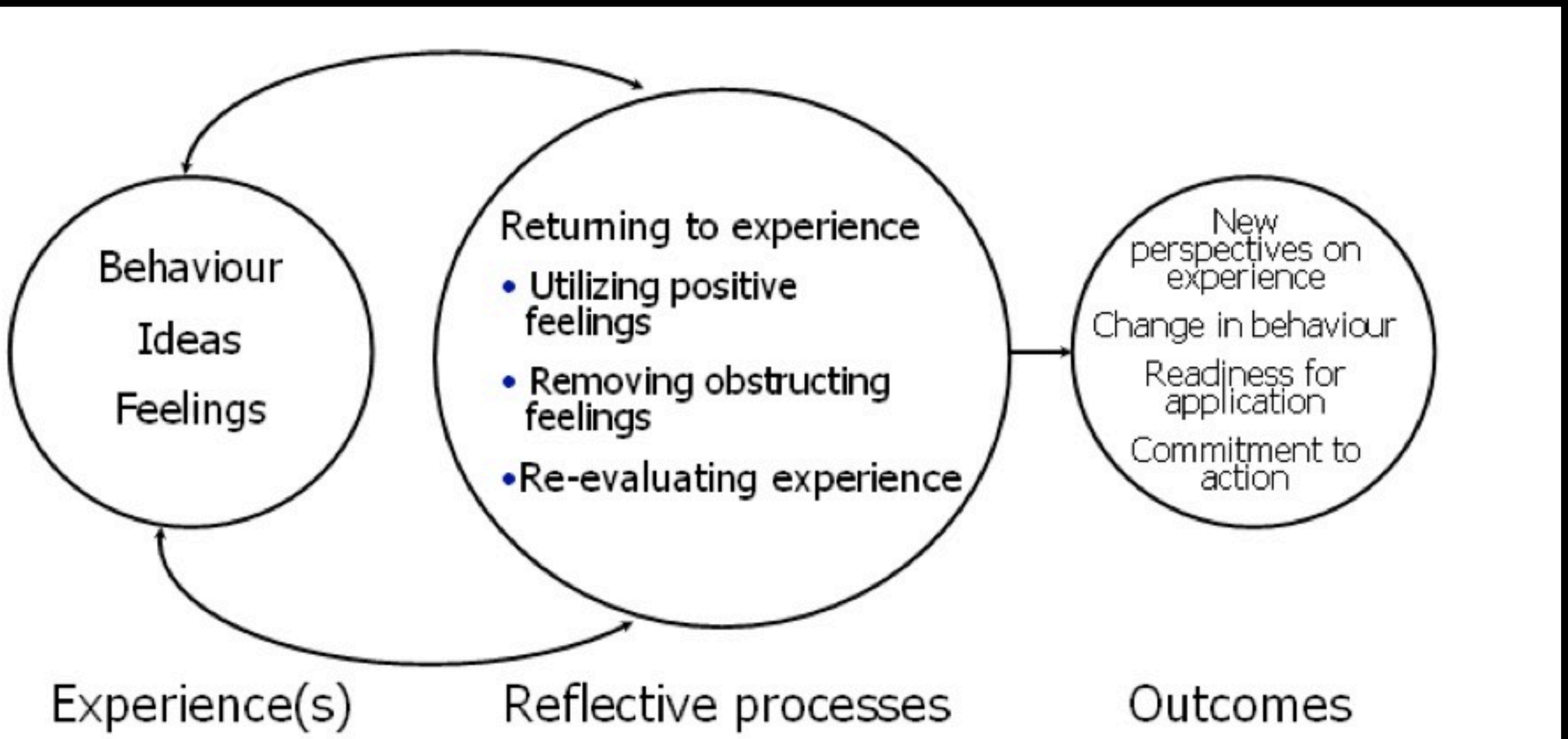
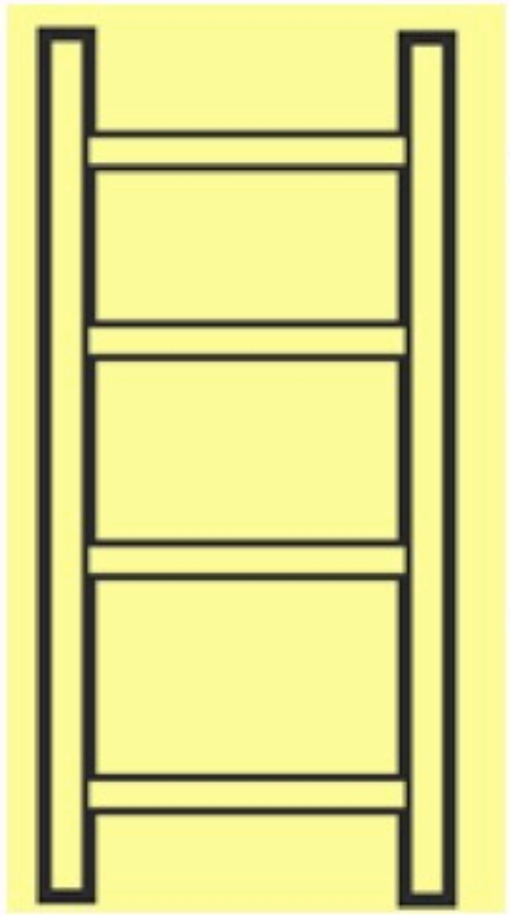


Figure 1.1. Boud, Keogh, and Walker's model of reflection (1985)

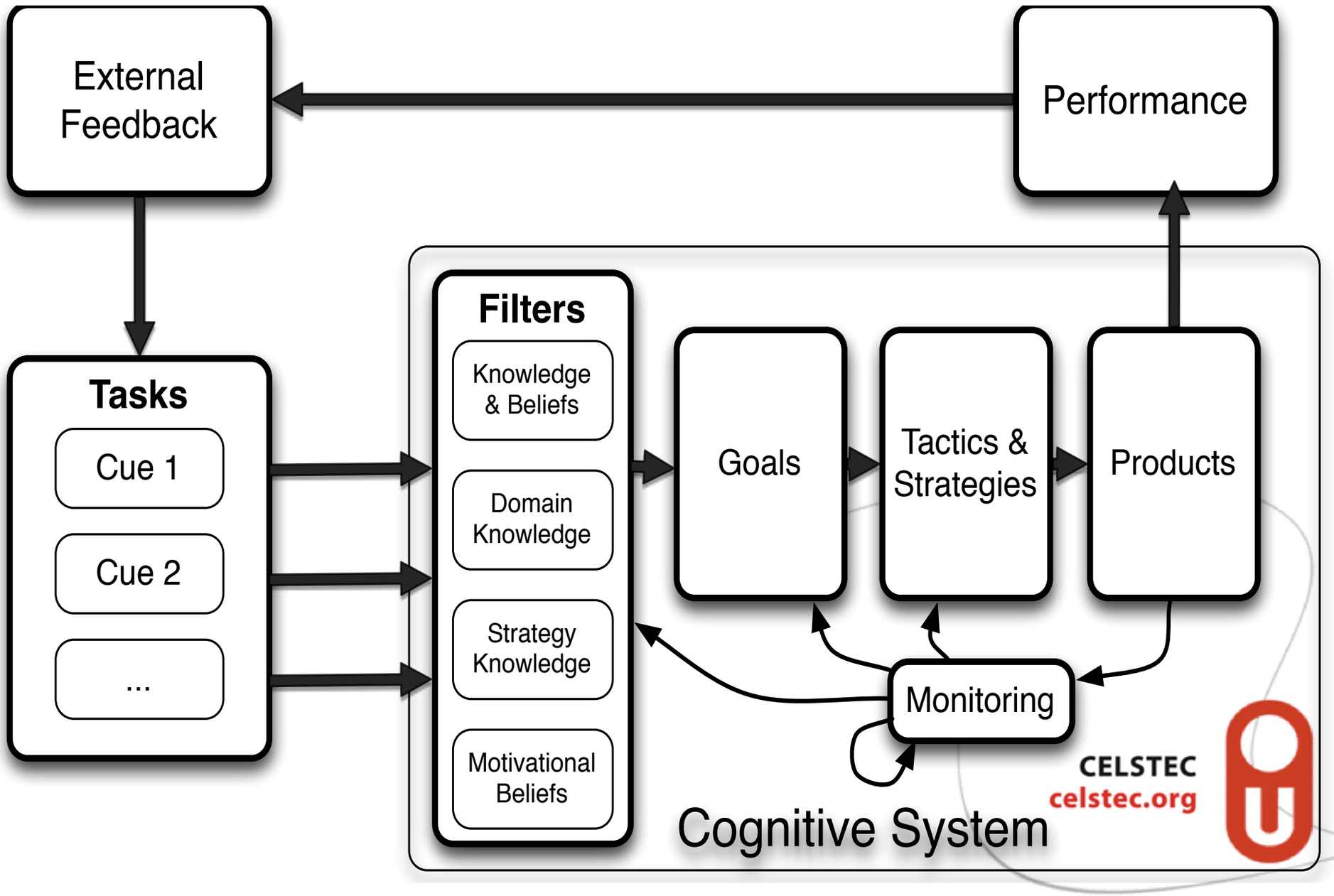


D. Schön's ladder of reflection ...

- **Reflection** is considered as a means by which learners can build and evolve a **mental model** of the learning process **they are committed** to and of their position inside this process (Seel, Al-Diban, & Blumschein, 2002), so that **appropriate directions and actions can be procured**.

Butler, D. L., & Winne, P. H. (1995). Feedback And Self-Regulated Learning: A Theoretical Synthesis. *Review of Educational Research*, 65(3), 254-281.

Feedback and Self-regulated Learning



Schön, D. A. (1983). The Reflective Practitioner: How Professionals think in Action. London: Maurice Temple Smith.

Concepts of reflection

- Reflection for action*
- Reflection in action
- Reflection on action

* Ertmer, P. A., & Newby, T. J. (1996). The expert learner: Strategic, self-regulated and reflective. *Instructional Science*, 24, 1-24.

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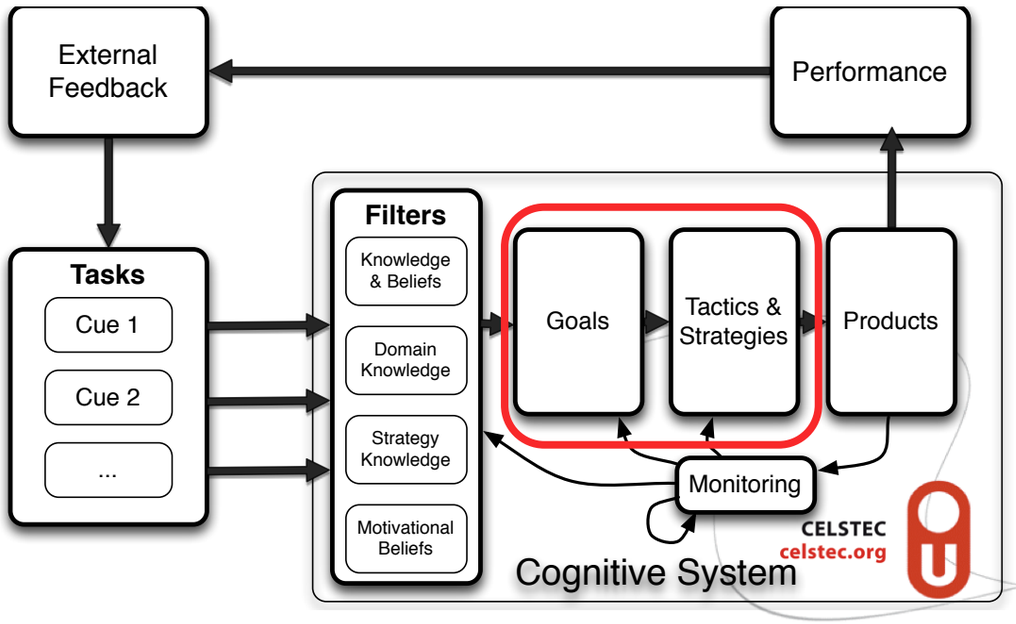
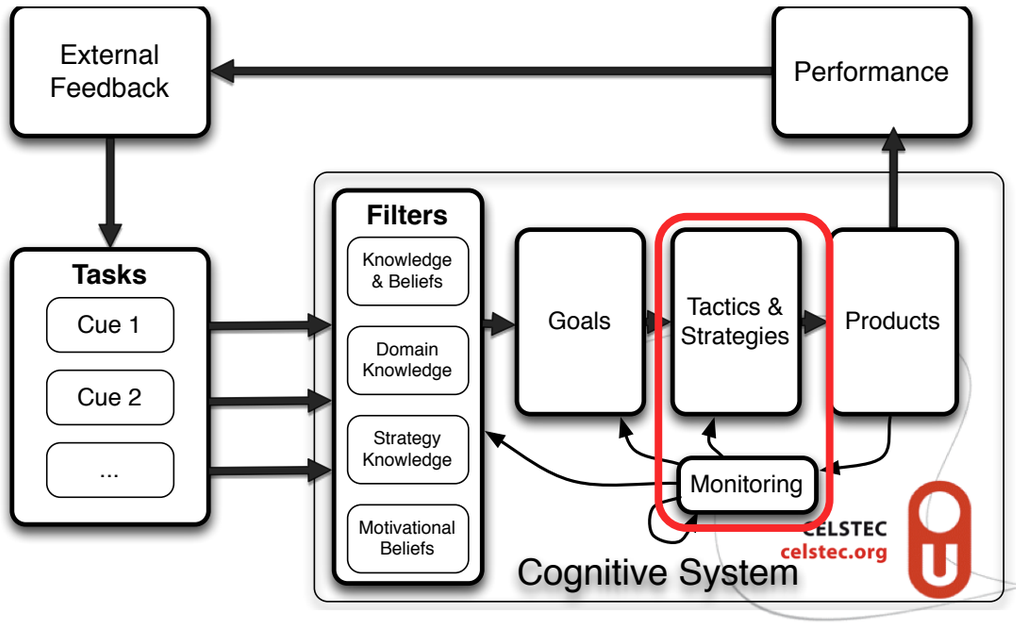
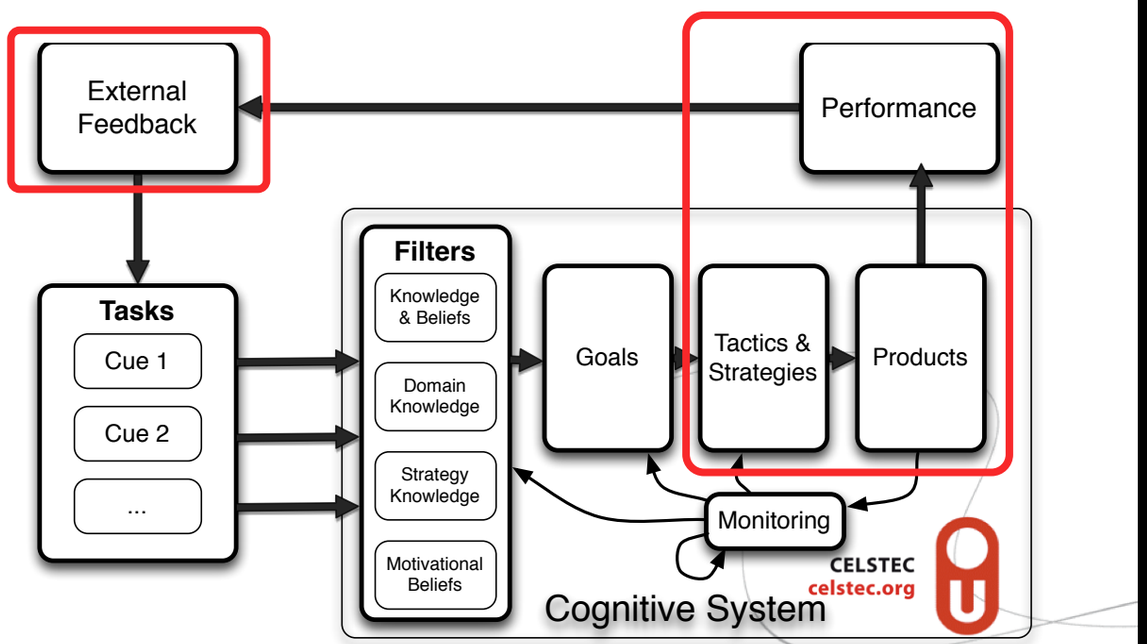
Reflection for Action



Reflection in Action



Reflection on Action

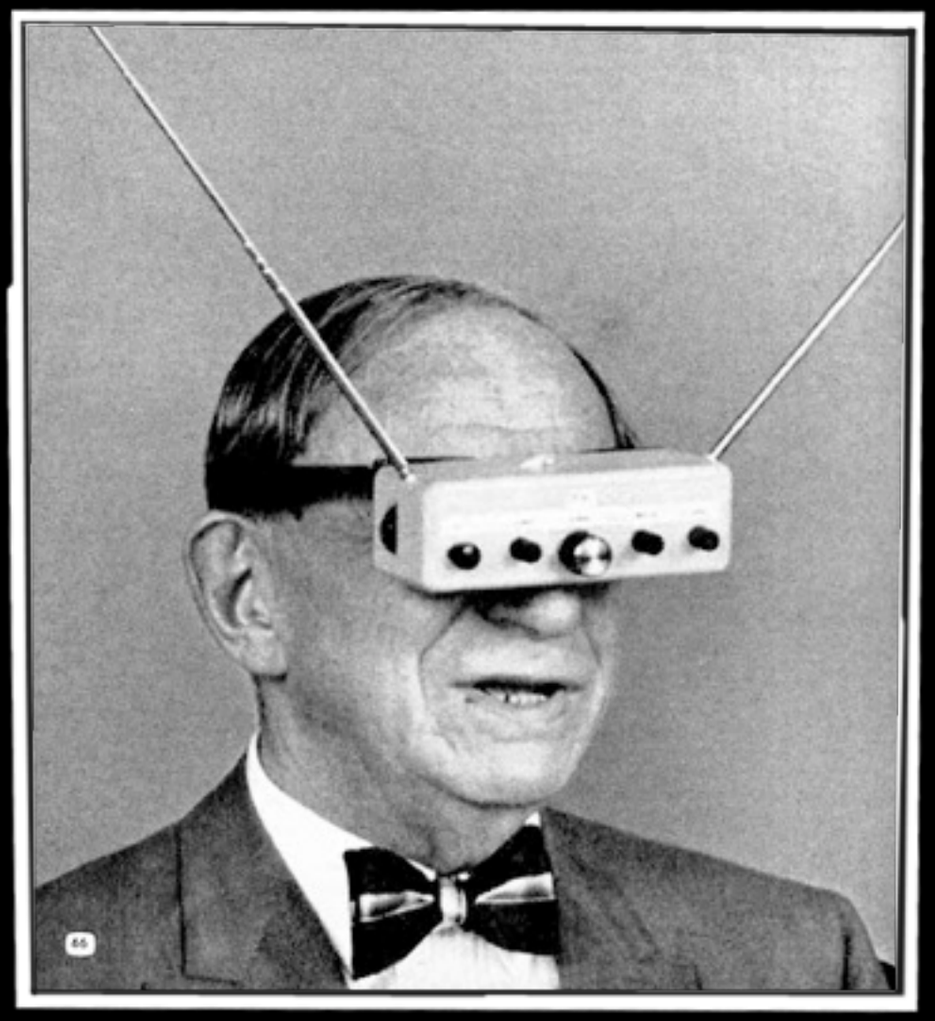


- Feedback loops are at the core of the learning cycle in TEL, different forms of feedback loops can be implemented

- Feedback aims at Situational Awareness, Reflection in and on Action, as also Behaviour Change

- This can happen in a self-regulated learning cycle including feedback and SA on different levels.

So what about augmented and mixed reality?



whitepaper online:
http://www.e-learningevent.nl/e-blog

youtube playlist:
http://www.youtube.com/
playlist?list=PLA2A5852D66C31396

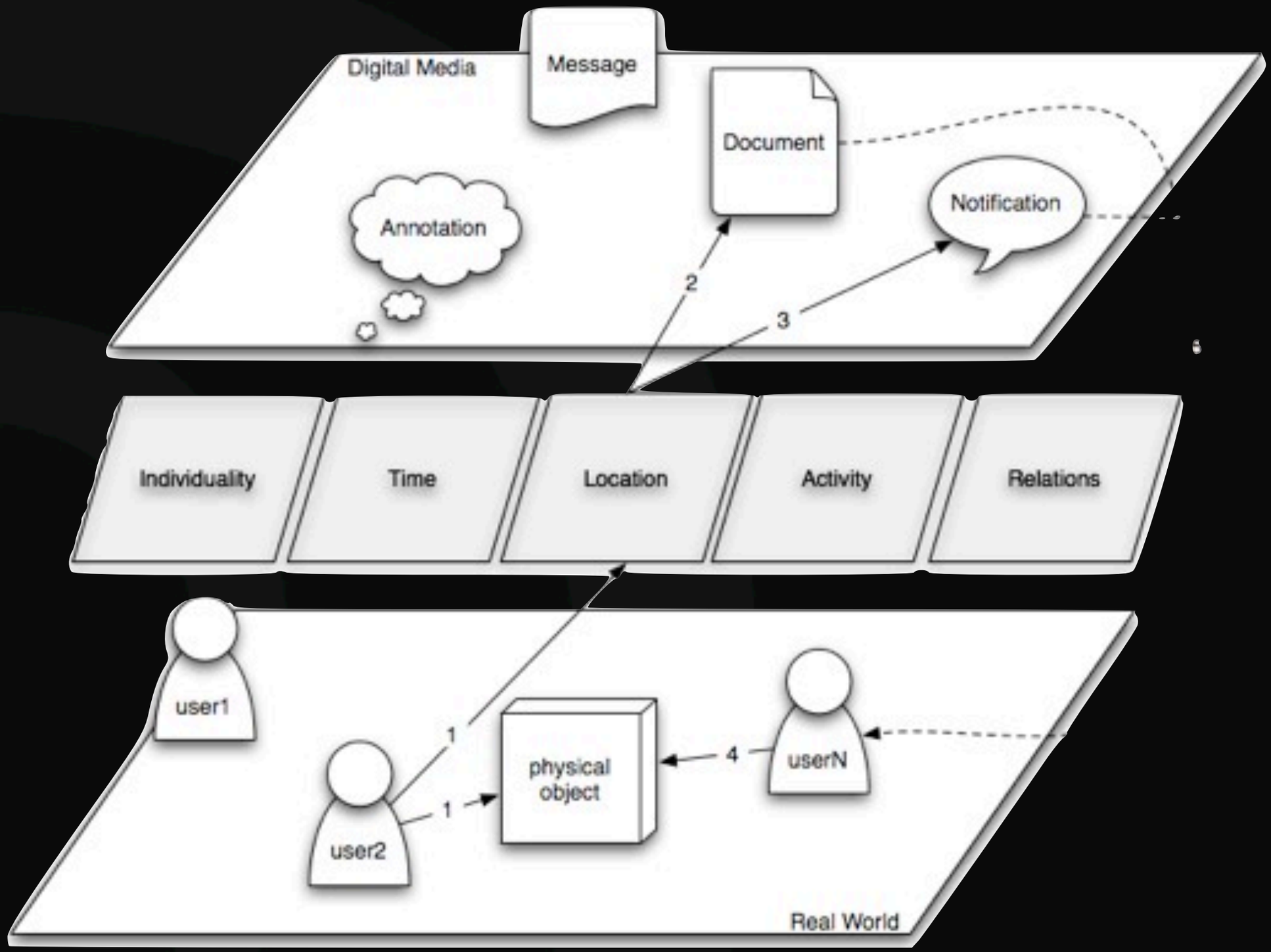
follow my blog for updates:
http://www.marcuspecht.de

follow OpenU Topic Mobiel Leren
http://openu.nl
http://portal.ou.nl/en/web/topic-mobile-learning

concept

Mixed/Augmented Reality is about linking digital and real world artefacts based on context parameters.

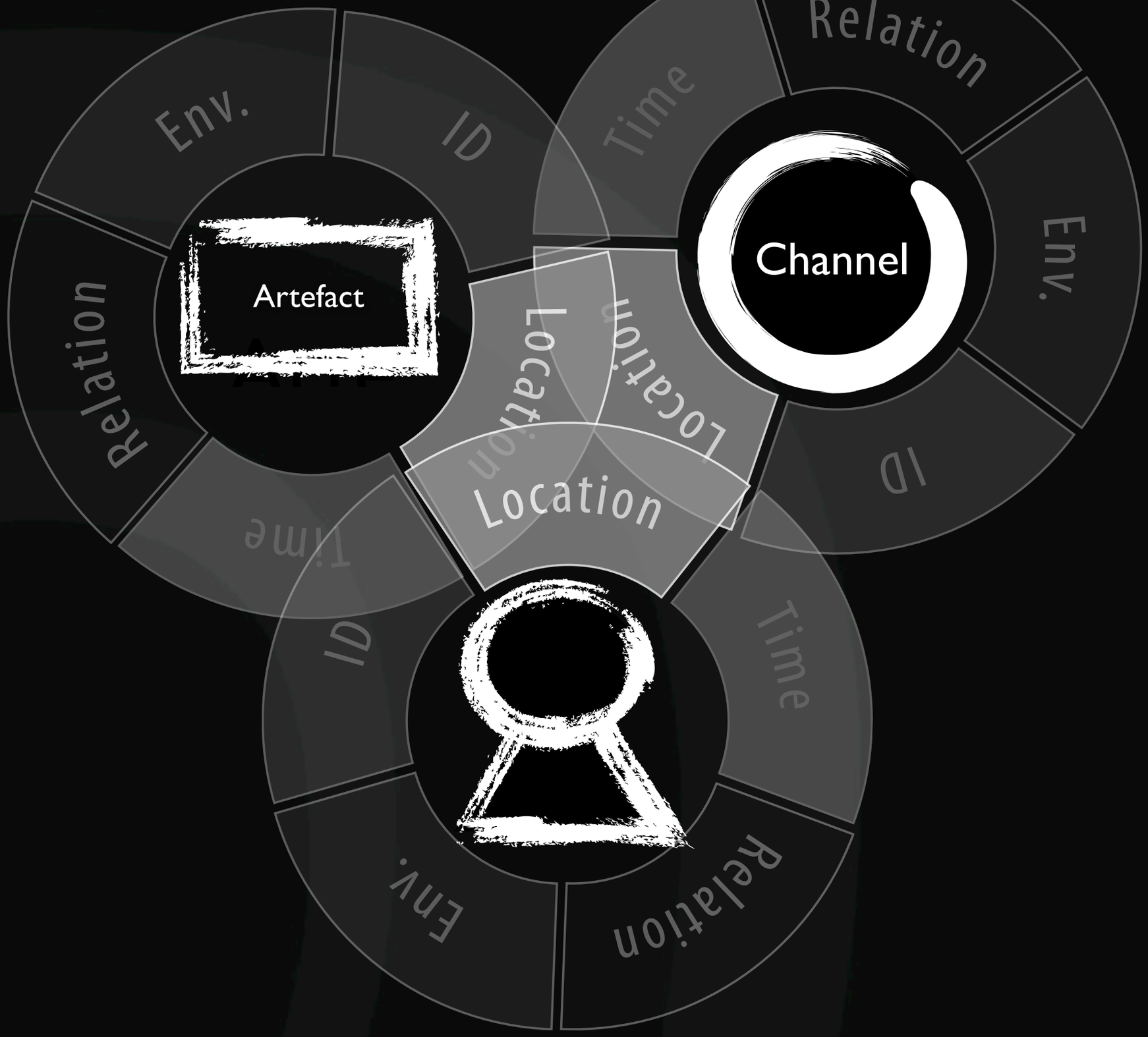
concept


Digital Media
Message
Document
Annotation
Notification
2
3
Individuality
Time
Location
Activity
Relations
user1
user2
1
1
physical object
4
userN
Real World

AICHE: *Ambient Information Channels*

http://www.designbynotion.com/metamirror-next-generation-tv/

concept


Artefact
Env.
ID
Time
Relation
Channel
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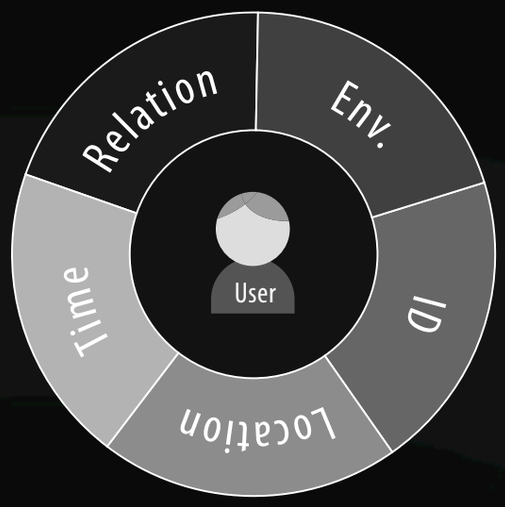
concept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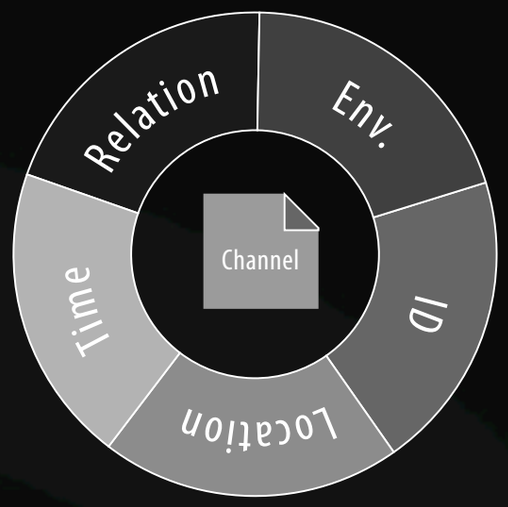
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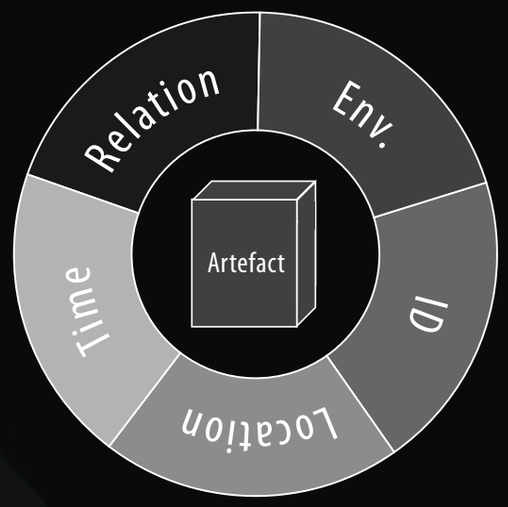
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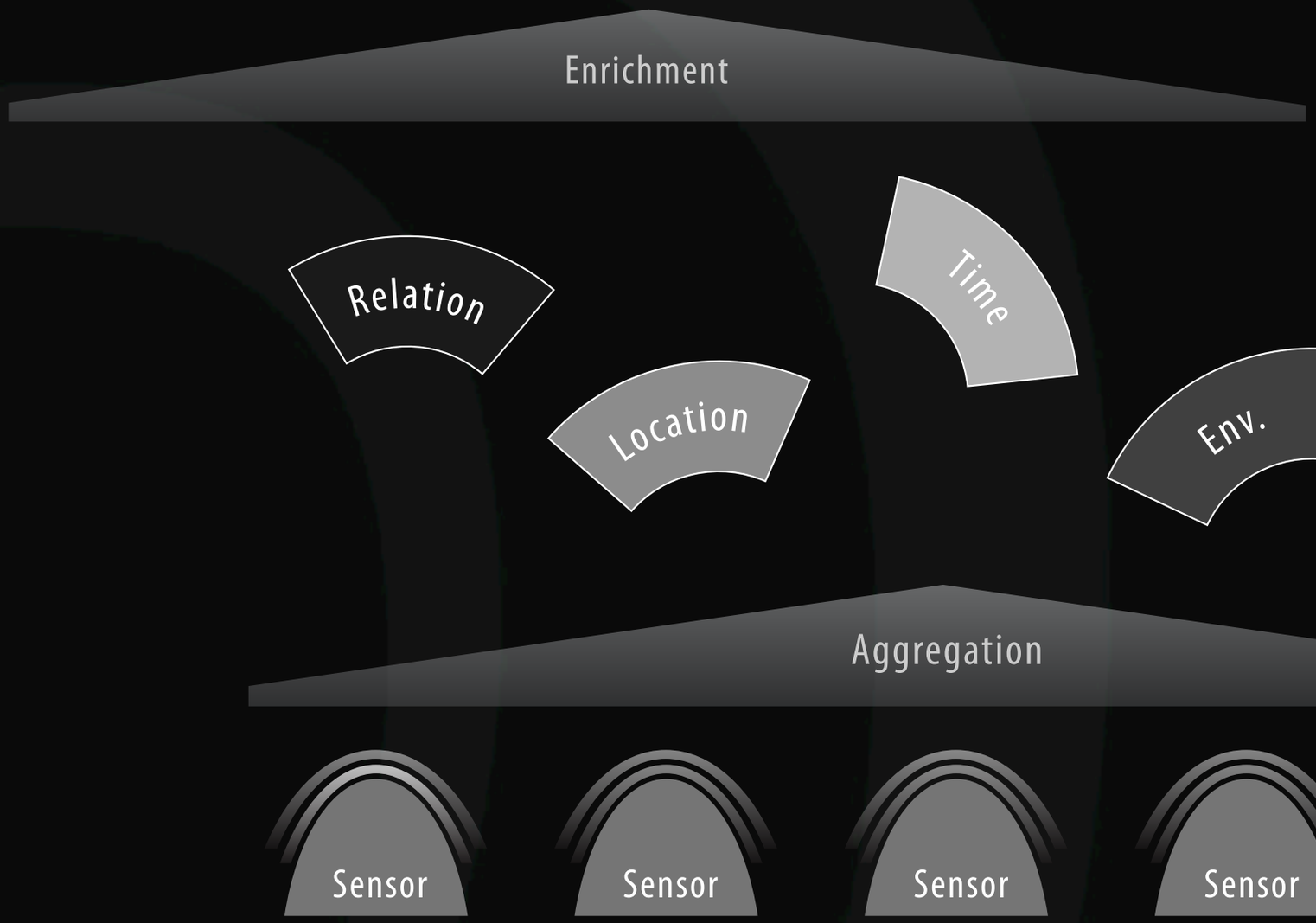
Enrichment
Relation
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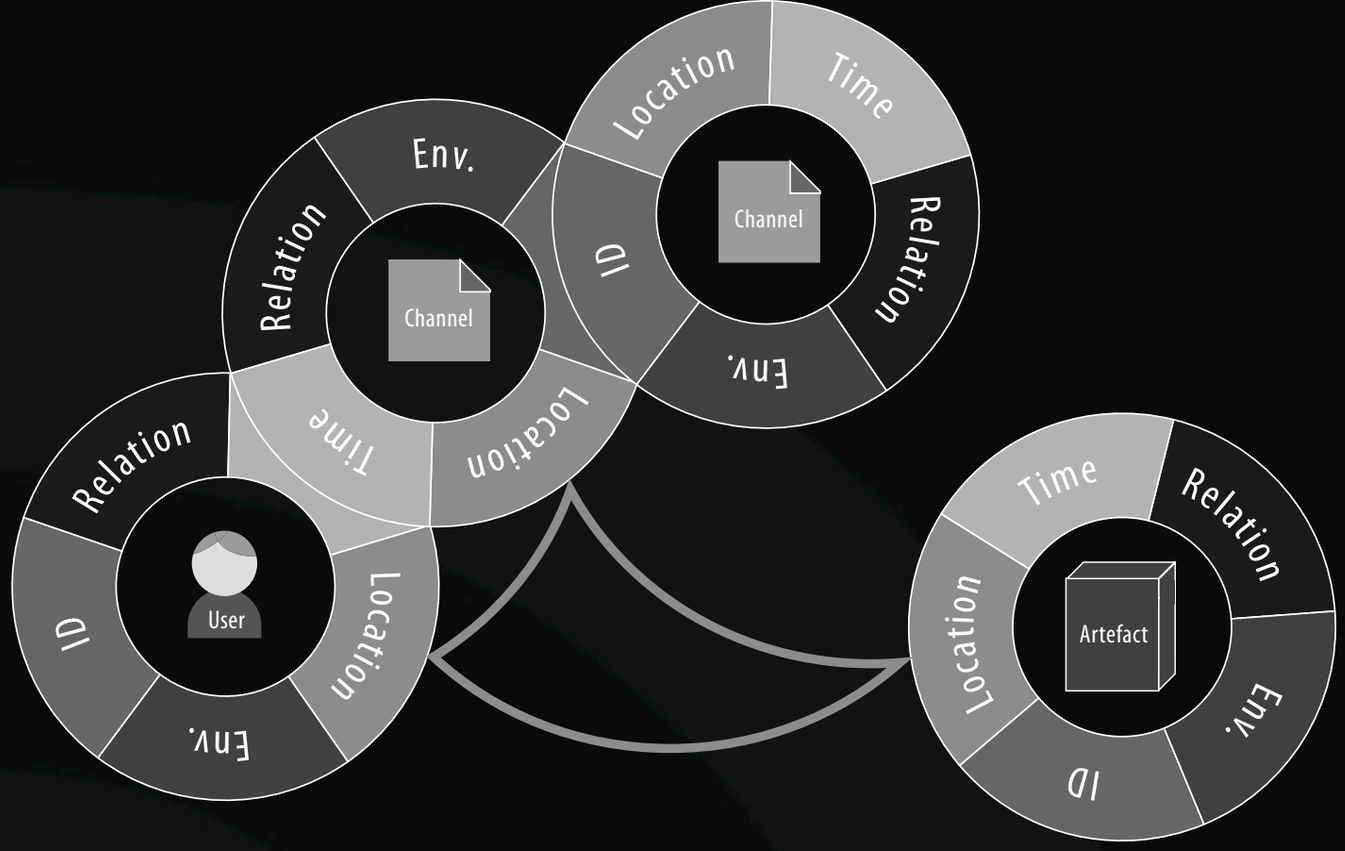
Aggregation
Sensor
Sensor
Sensor
Sensor
Sensor

concept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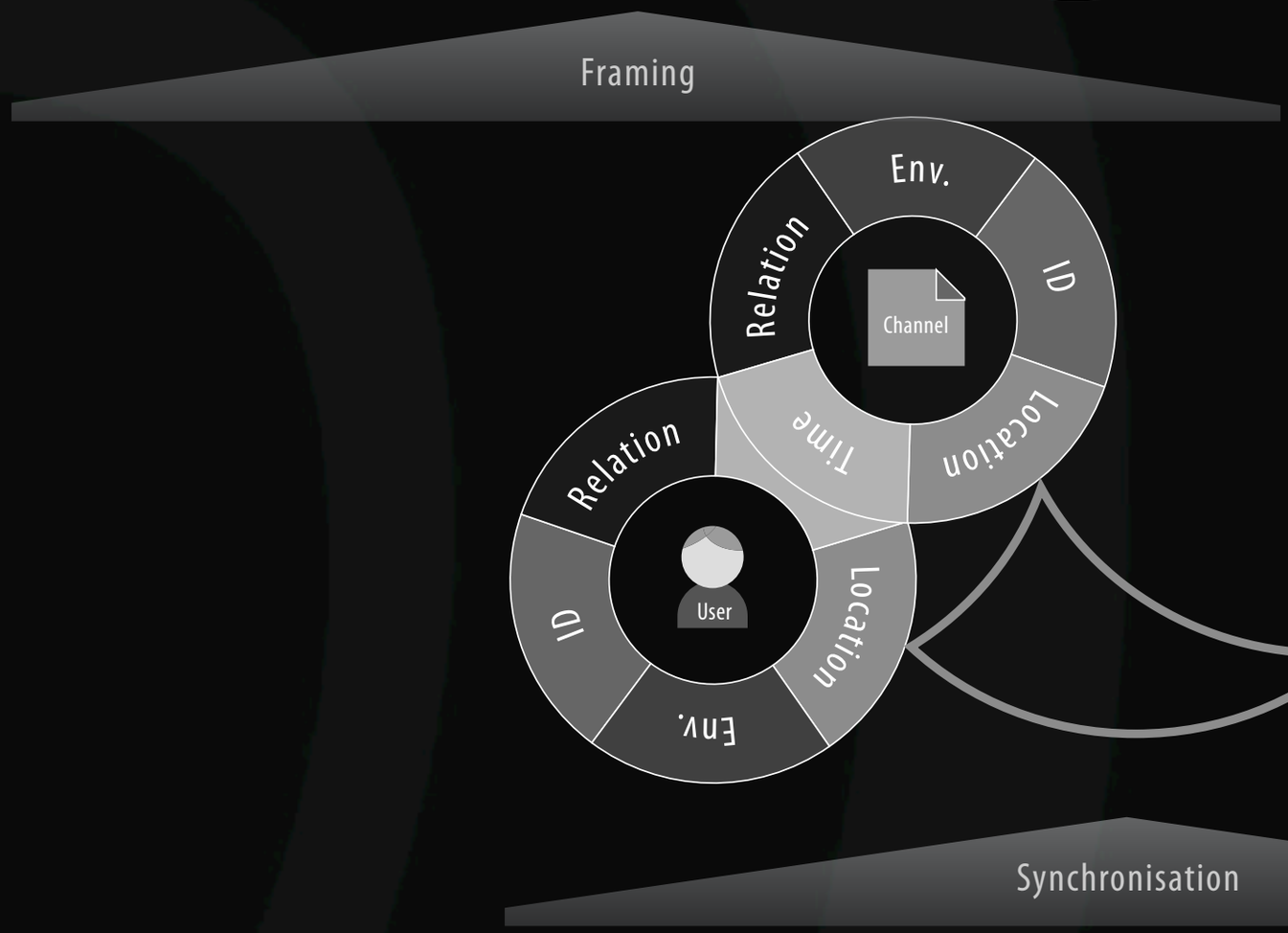
Framing
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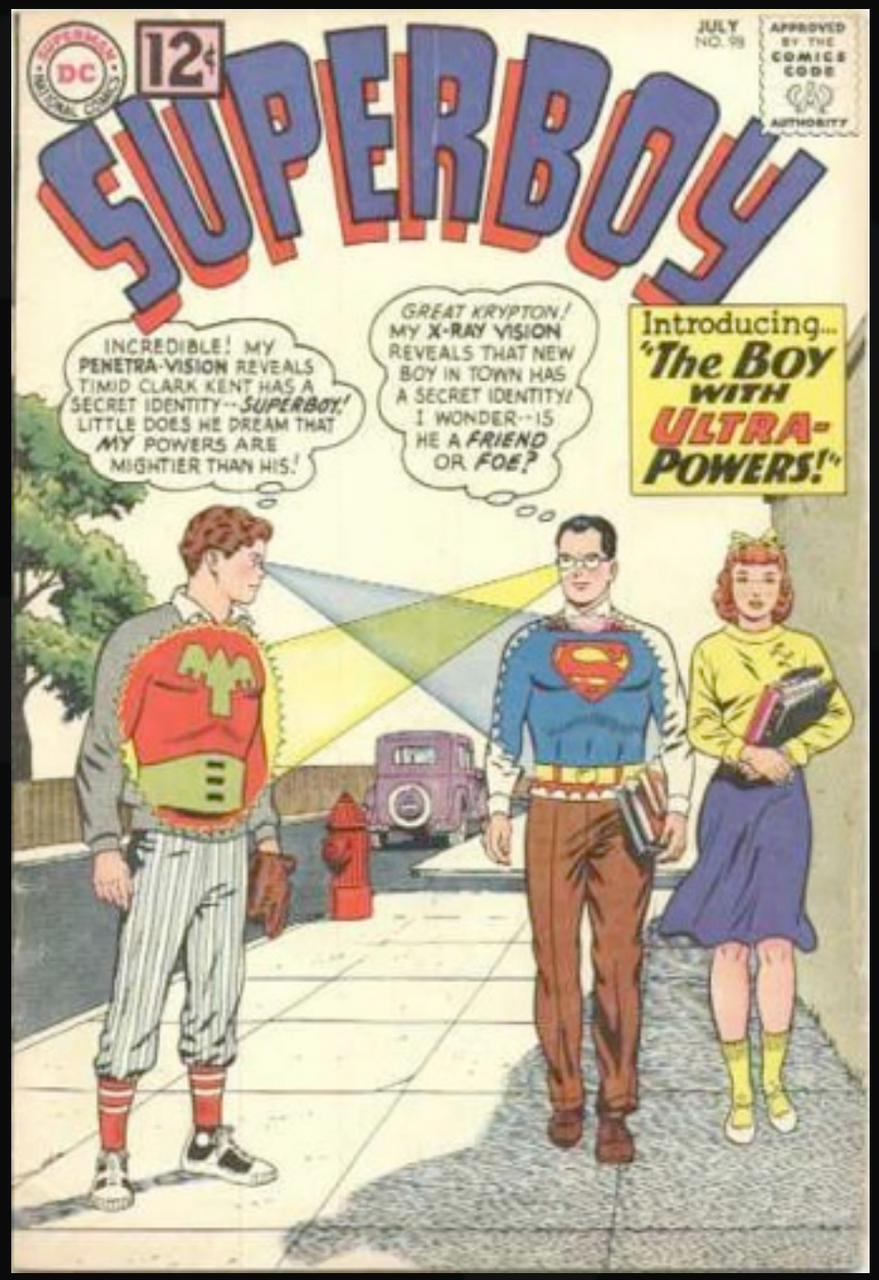
Artefact
Synchronisation

Interaction
HCI Patterns



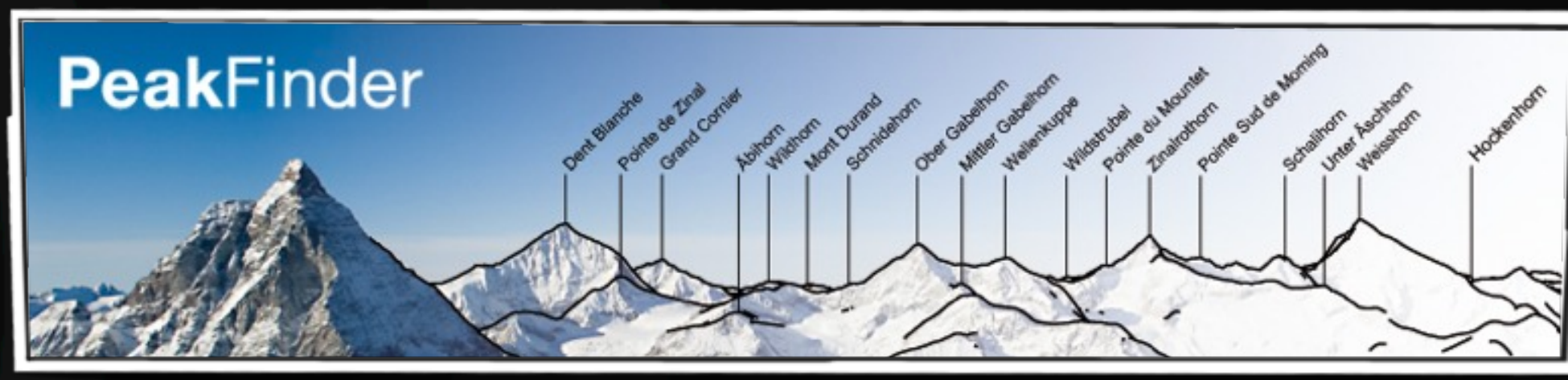
Interaction Patterns

http://uxmatters.com/mt/archives/2009/08/inside-out-interaction-design-for-augmented-reality.php

Interaction

HCI Patterns

HUD

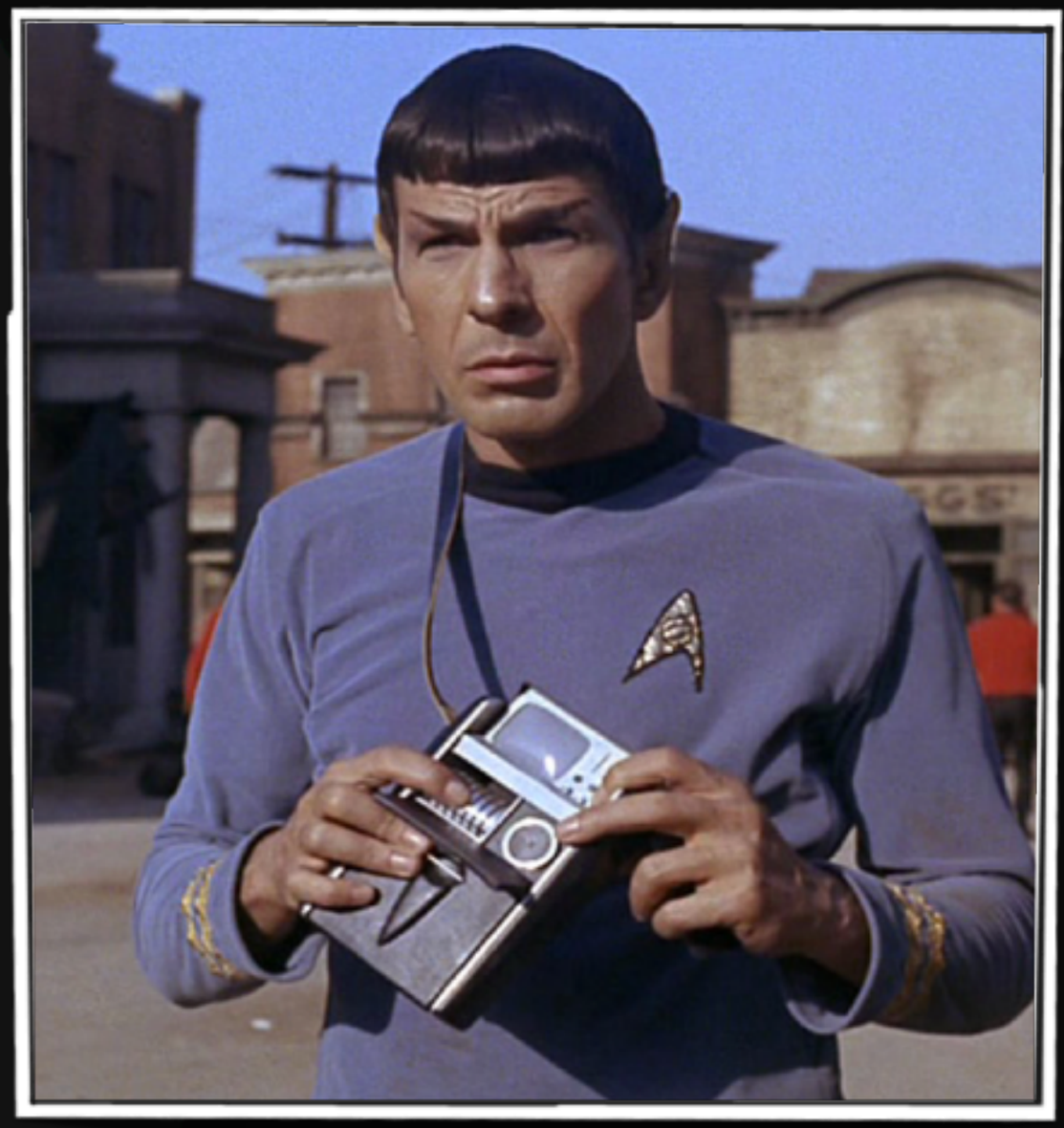


http://www.peakfinder.org/

Interaction

HCI Patterns

Tricorder



Interaction

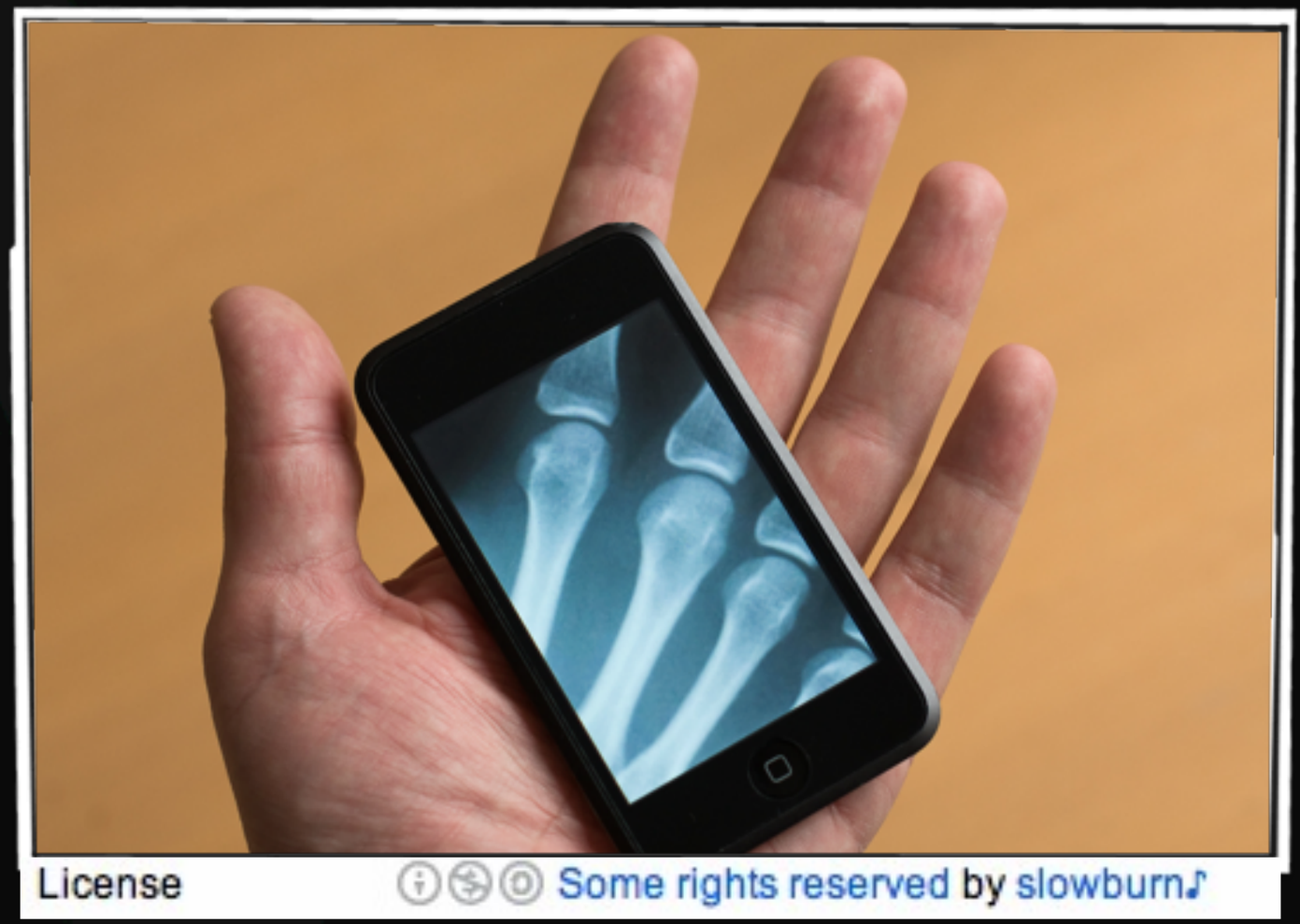
HCI Patterns

Holo chess

Interaction

HCI Patterns

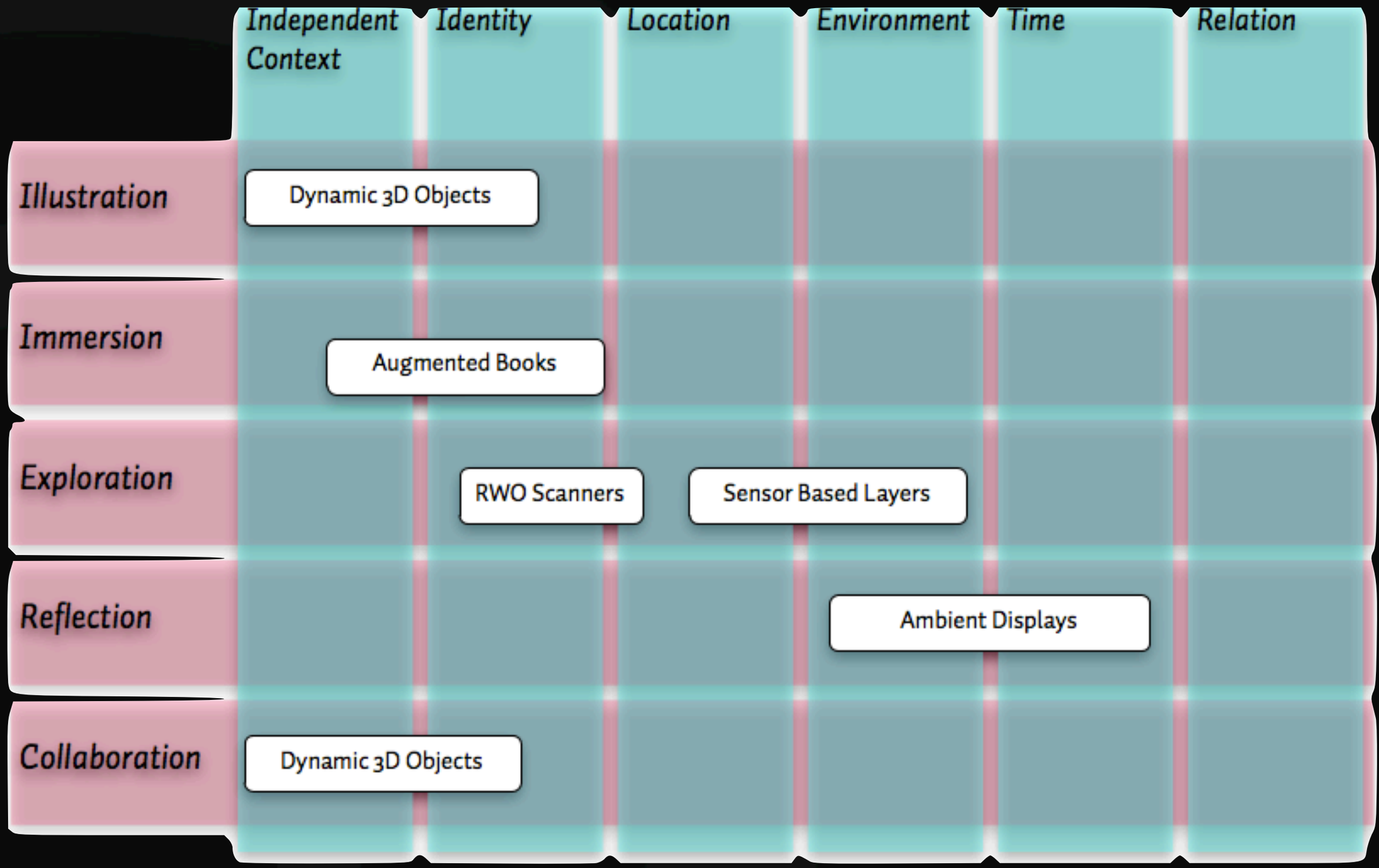
X-Ray Vision



Different Modalities

Educational Patterns

Educational Patterns



multiple perspectives, dynamic media, illustration, enrichment, collaborative digital media

3D Content
Educational Pattern

3D Dynamic Objects

3D Models to visualize concepts of the learning content (Geometry, Math, Astrology, Engineering, Architecture)

enrichment, immersion, situated and contextualized media

Augmented
Educational Pattern

Augmented Books

Enrich a book experience with augmented content, can be 3D Models or contextualized information.

RWO
Educational Pattern

RWO Scanners, Proxy

Scan RWO for additional information, exploration driven.
Example: Language Learning

Sensor Layer
Educational Pattern

Sensor Based Layers

Present POI Information based on the current sensor information got from user device.
Example: Wikitude

Coll.
Educational Pattern

Collaborative Annotation

Shared digital annotations filtered by user context and following a learning logic.
Example: Locatory.

work at CELSTEC

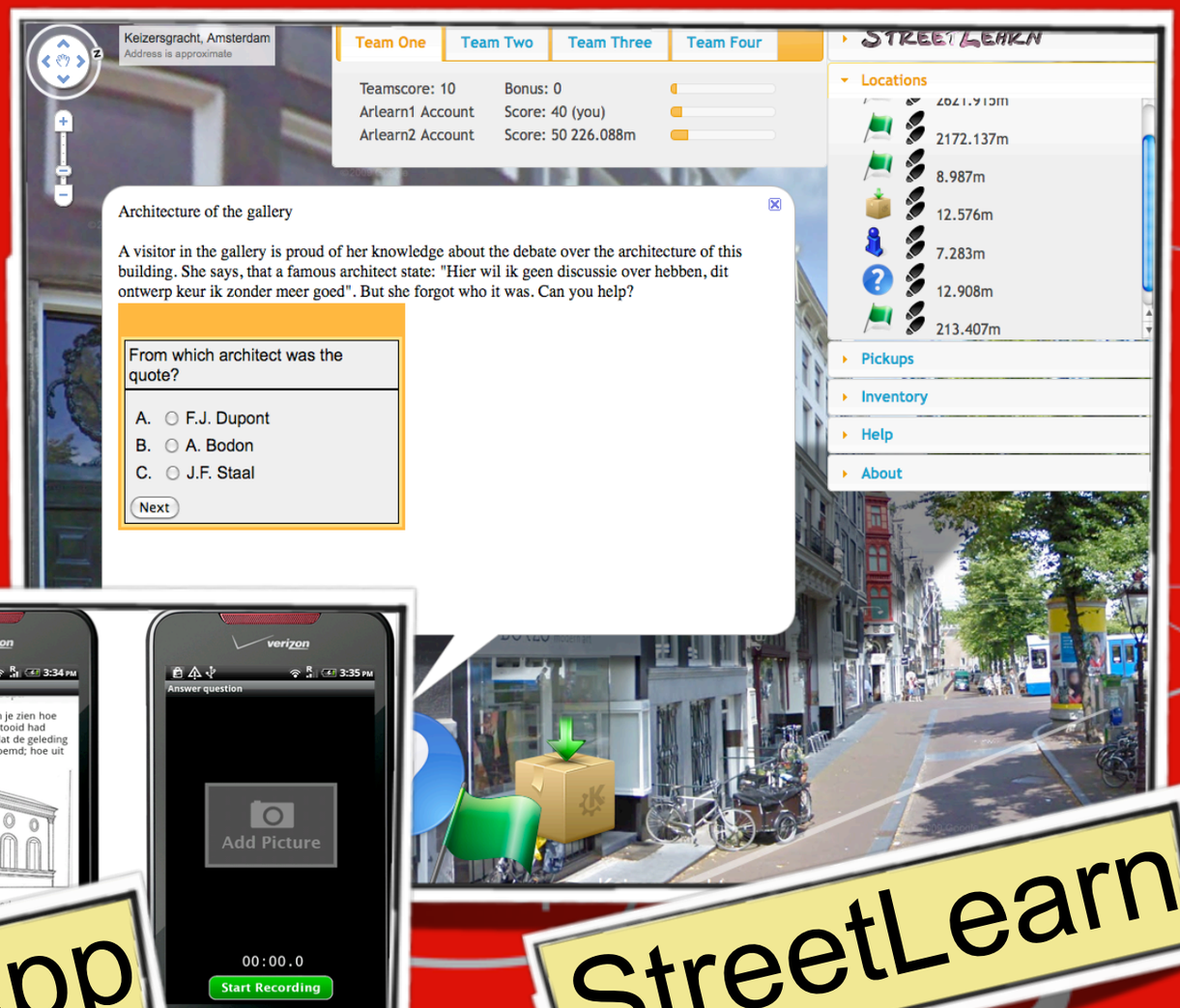
- #1 ARLearn
- #2 weBuild
- #3 Mobile Reflection Amplifiers
- #4 Energy Awareness Displays

#3 CELSTEC: leren in context

arlearn

http://code.google.com/p/arlearn/

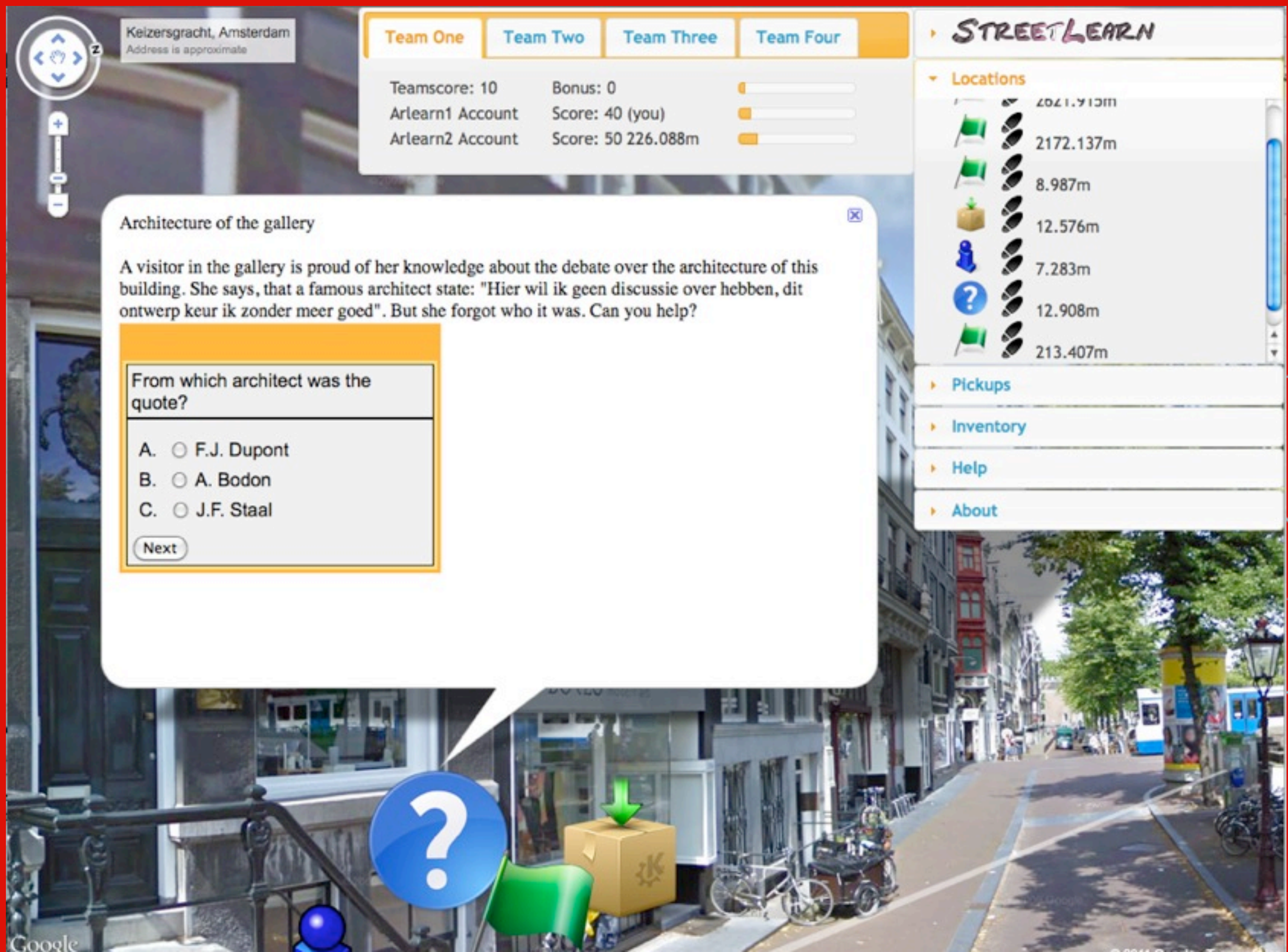
- *Augmented Reality Games,*
- *Excursions,*
- *Mixed Reality Games,*
- *Mobile Games and Simulations.*



ARLearn Case studies

	Florence case	*Amsterdam case*	*Hostage case*
Game design	Scavenger game	Adventure game	Decision game
Delivery Channel	augmented reality	augmented virtuality	augmented reality
Pedagogic approach	situated learning	expository learning	learning through decision taking

Streetlearn: ARLearn streetview client



UNHCR Hostage Training

- Hostage taking situation:
  train employees to handle a hostage taking situation
- Simulate stress through notification framework: many things to handle, little time available
- New events come in:
  employees need to react in time
- multitask: make it easy for 2 instructors to simulate a hostage taking situation with 18 trainees.
- Different roles with customized content:
  staff welfare, head of office, security official

verizon

10:26 AM

ARLearn2

arlearn

UNHCR
The UN Refugee Agency

((touch to start))

menu

verizon

10:28 AM

Message List

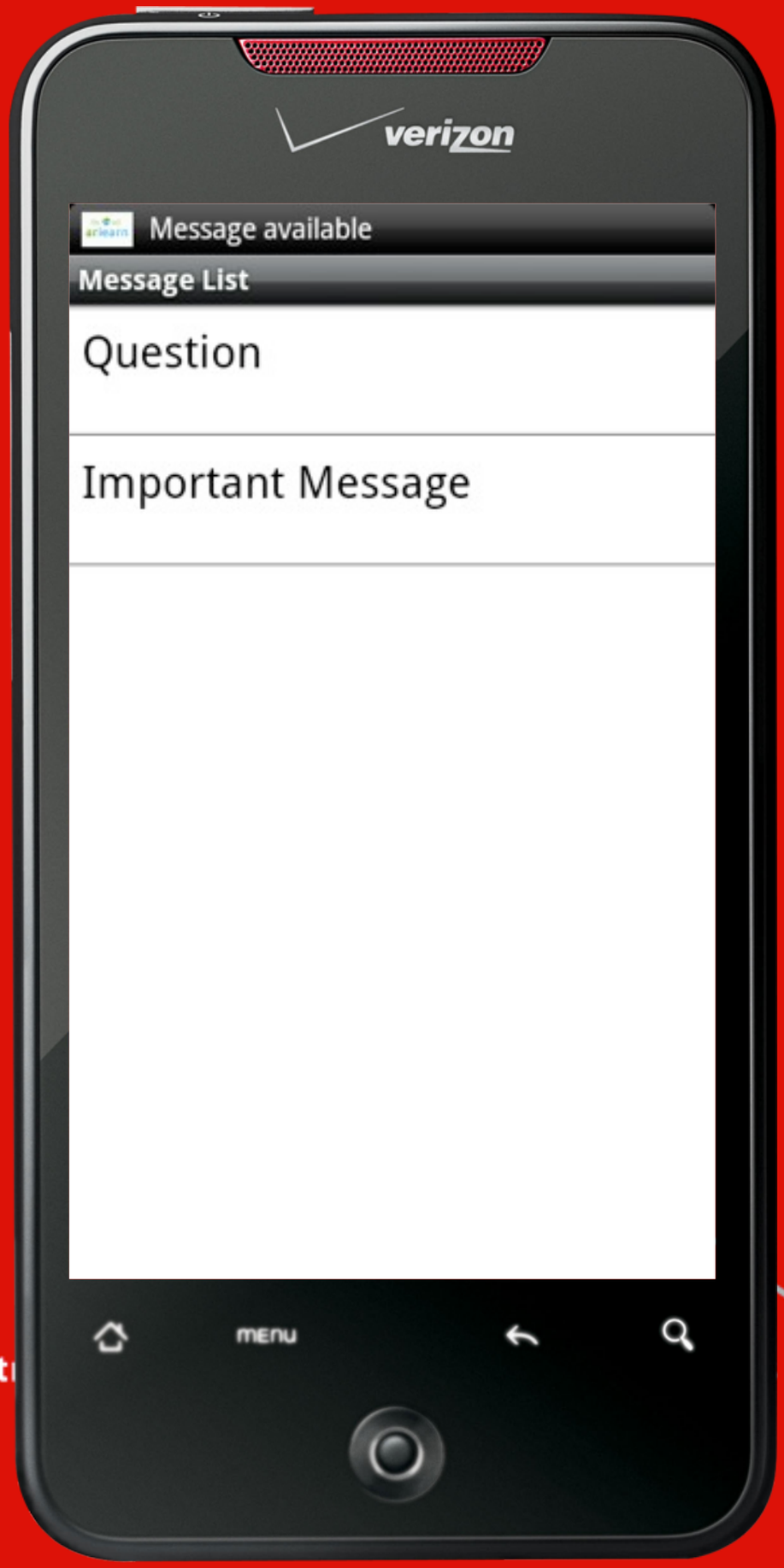
Important Message

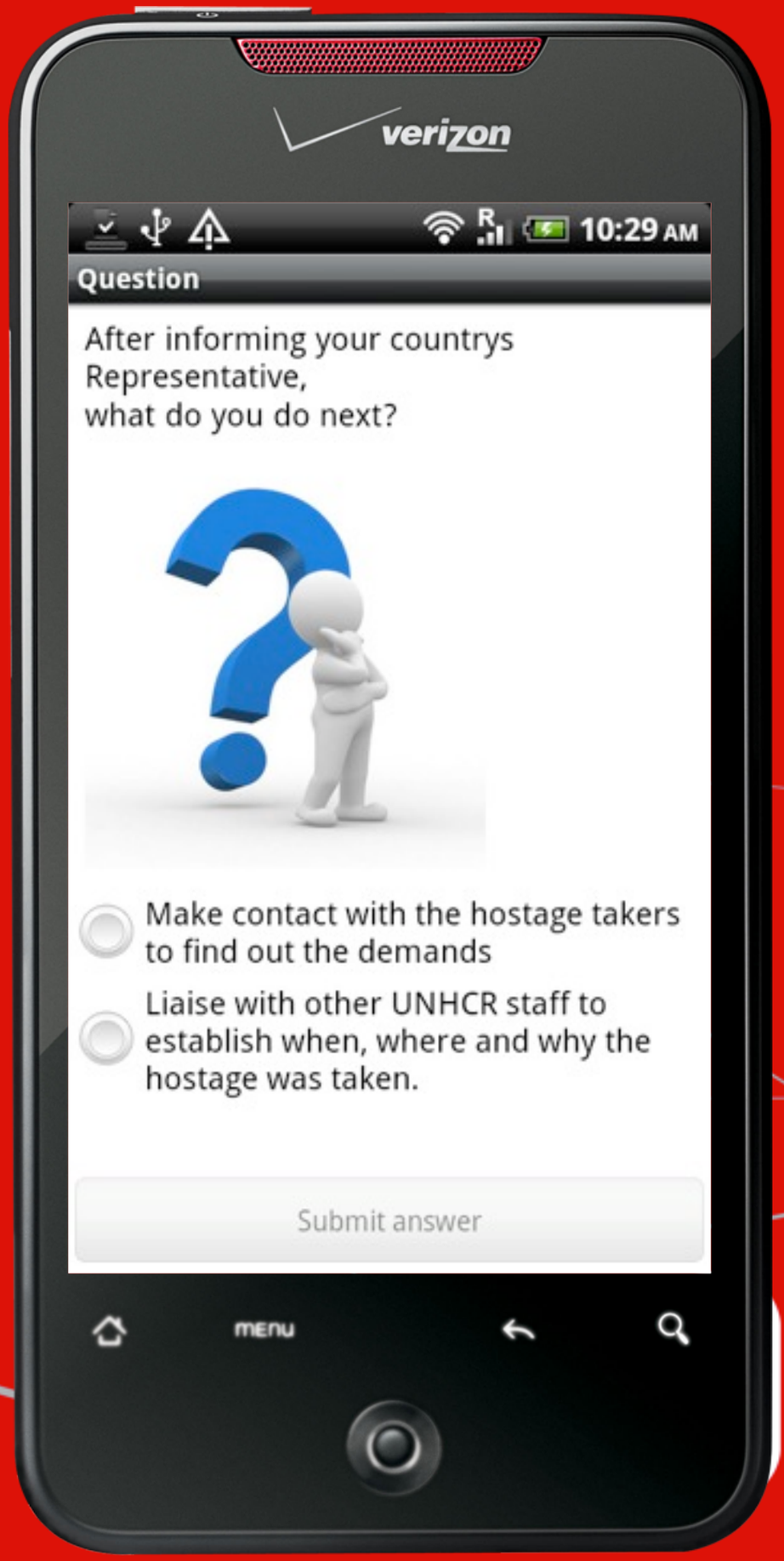
verizon

00:02

00:23

menu


verizon
Message available
Message List
Question
Important Message
menu


verizon
10:29 AM
Question
After informing your countrys Representative,
what do you do next?
Make contact with the hostage takers to find out the demands
Liaise with other UNHCR staff to establish when, where and why the hostage was taken.
Submit answer
menu

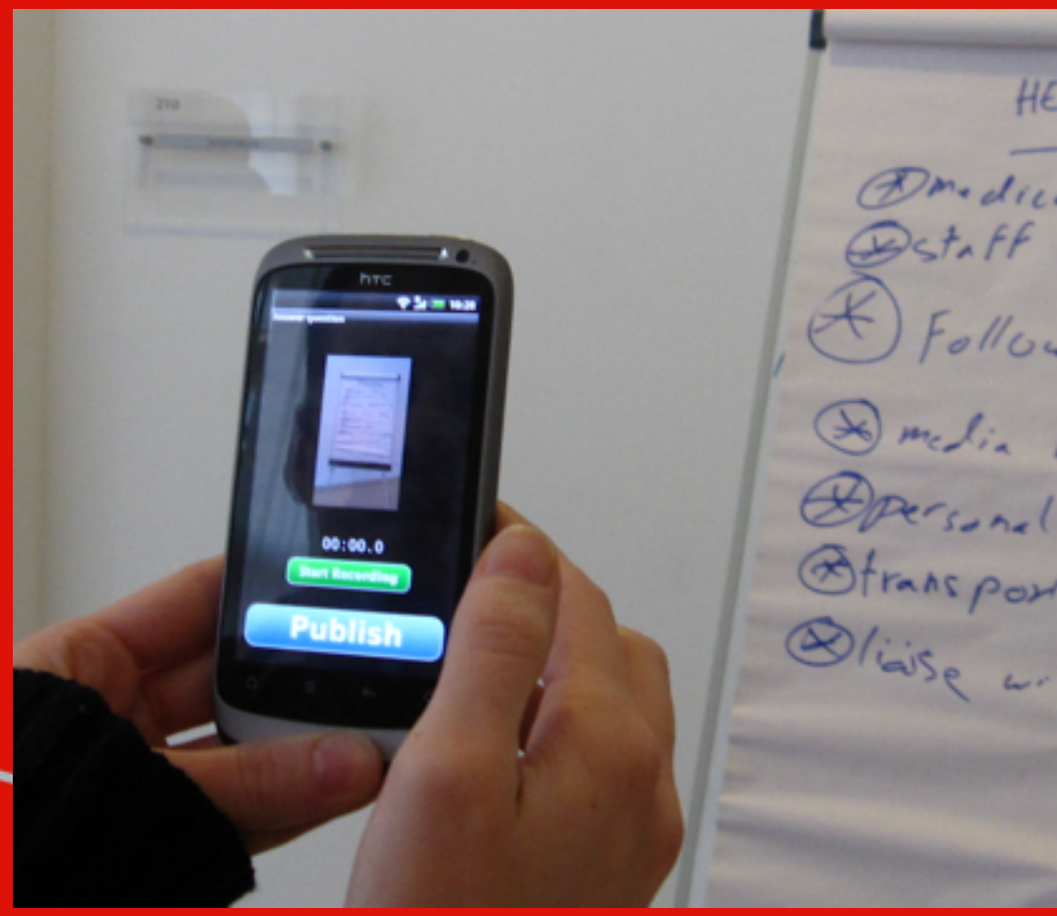
Roles / teams

Head of Office - Security Officer - Staff Welfare

a role is performed by a small group with smartphone.

advance organizer for real drill

take decissions / collaborate



...towards a location-based multi-user game

game features, patterns:

- resources, play money
- location-based actions and resource collection
- augmented objects
- collaborations, team play, real time chat
- high score, group score

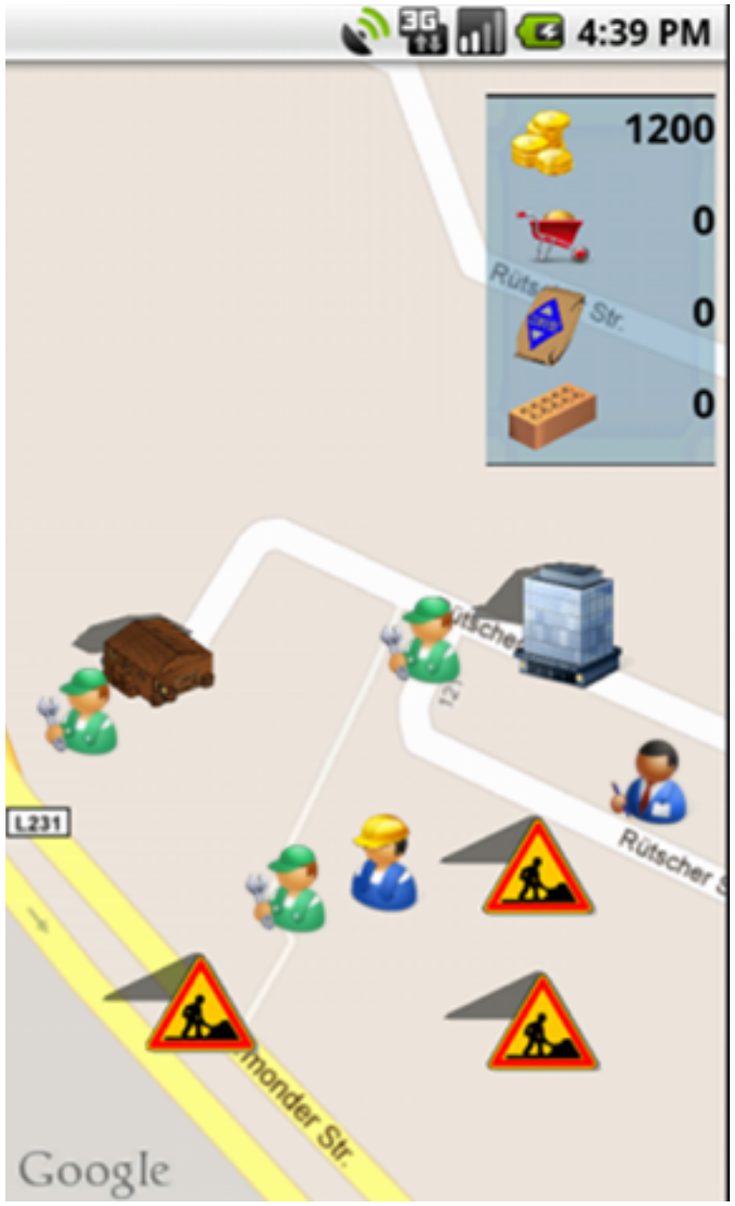
our starting points ...

- Using existing standardized content ECDL and a simulation game as backbone SPITKOM Project
- Thinking about Mobile Game Design Patterns (Davidsson, O., Peitz, J., Björk, S., 2004)
- How to couple game components to real world situations to get third chance learners engaged?

BAUBOSS


Abmelden
Spiel
IT-Café
Profil
Avatar Editor
Punkte 16887
107445
Nächste Einnahmen in
3h 17m 42s
Mauerspiel
Bauen
Nächster Levelaufstieg
17700
IT-Checker 360
Teamgeist 80
tuner76
schw3de
amc
proof42

Game Design – Learner View

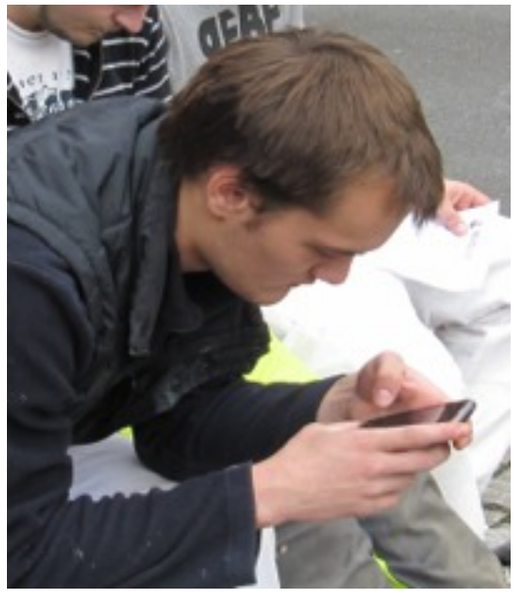


Game

Warehouse

Bank

Game Testing



mobile Reflection Amplifiers

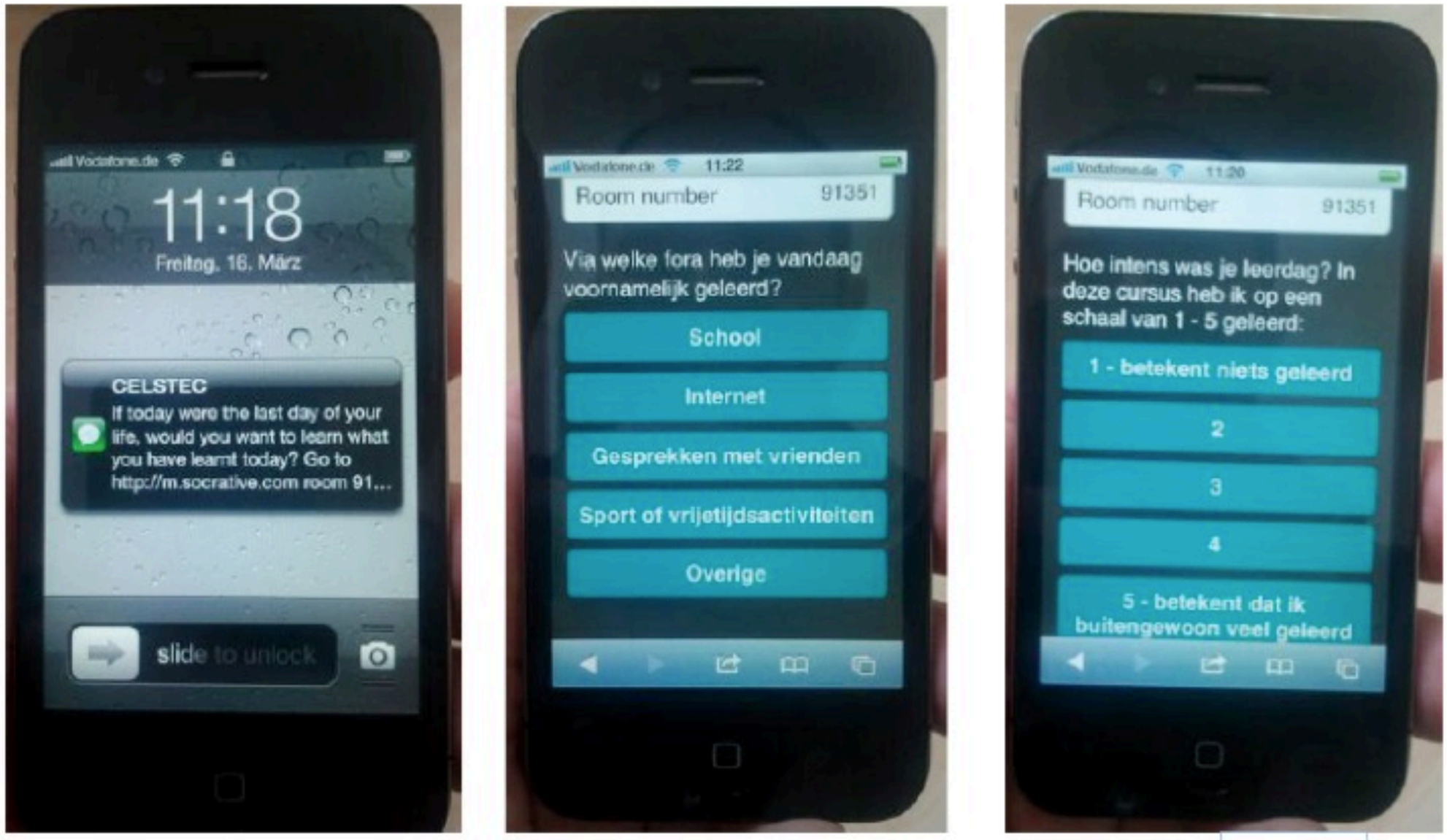
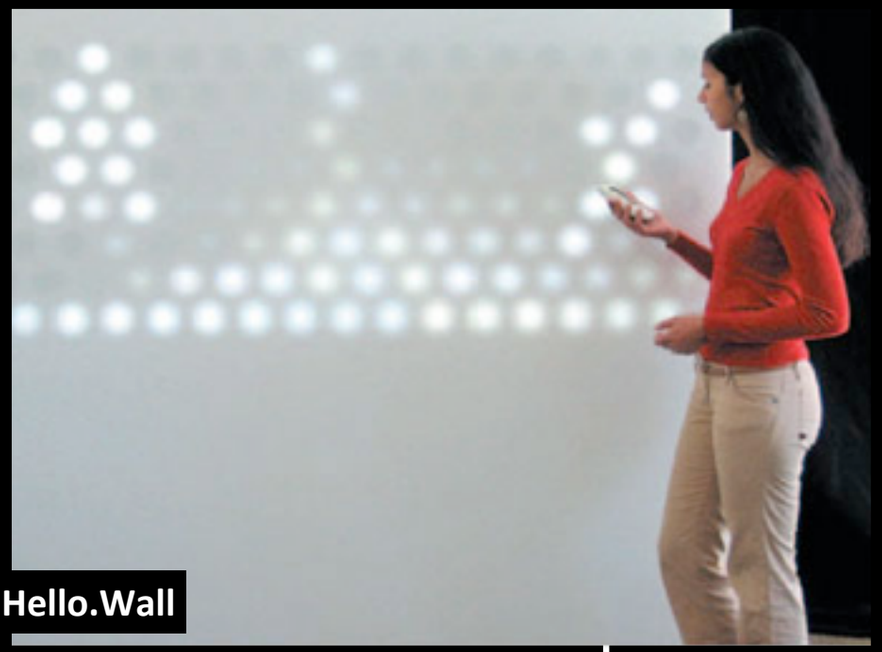
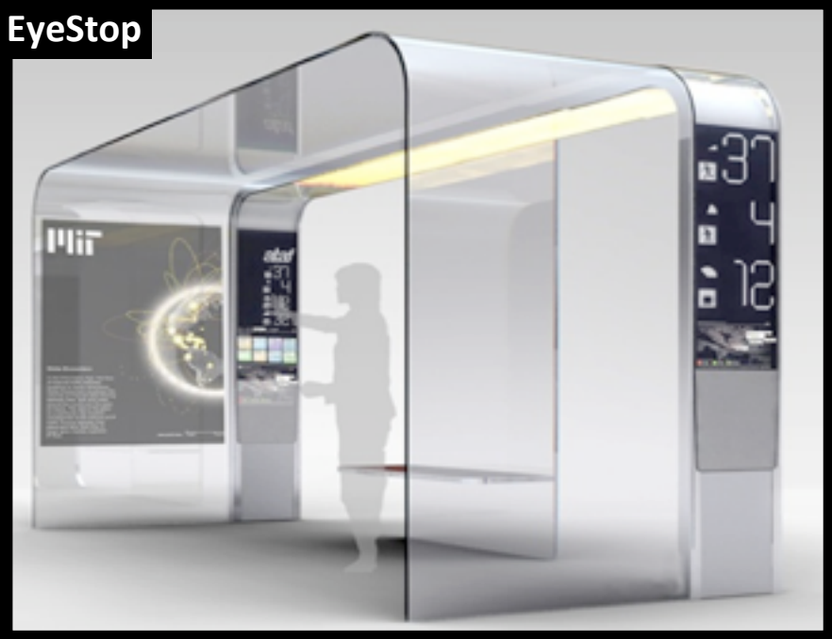


Figure 8.2. Student reflective practice a. Daily SMS received by students. b. What were your main learning channels today? c. How intense was your learning day? Rate it from 1 to 5.



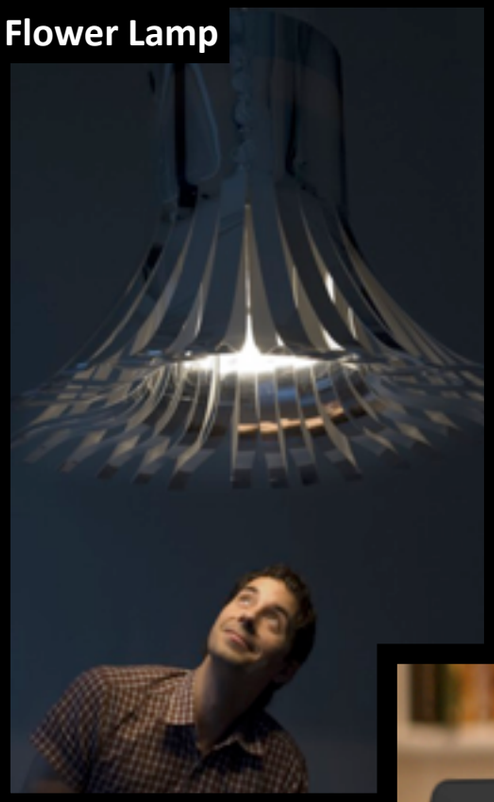
Hello.Wall



EyeStop

Nuage Vert

Ambient Umbrella



Flower Lamp

UbiGreen

Power Aware Cord

Orb

BBC

Digital Retail

http://www.plugwise.com/

Energy Awareness

Rooms | Groups

- Coffee Machines
- Printers
- Gaming Consoles
- Workplaces
- Hot Desks
- Water Coolers

Appliance(s)

- Workstation 1.27 Door
- Workstation 1.27 Window
- Workstation 1.28 Door
- Workstation 1.28 Window
- Workstation 1.39
- Workstation 1.40 Door
- Workstation 1.40 Window

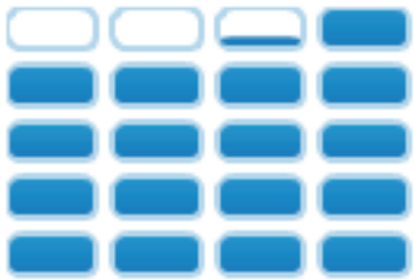
Current Usage
215 W

Hot Desks

Total Usage Today
0.91 kWh

Explore | Relate | Compare

Select a room/group or appliance to relate it's consumption.



3674 Campus²

548 Chiba²

6.7 Employee²

0.91 Hot Desks¹

¹ Total usage today in kWh.

² Total usage in kWh/day, based on the estimated total energy consumption February 2009 - February 2010, assuming 250 working days.

Experiment 2

Experiment 3

Display design #1

Energy Saver

3*Bronze/3*Silver/3*Gold
on the respective lower levels

90/450/900

Knowledge

15/75/150

Resources

General

Saving / Potential

Light

Heating

Stand-by

Print

Stairs

Consumption Data

Action

45/225/450

Light

Heating

Stand-by

Print

Stairs

+15

Communication

30/150/300

Yammer

Blog

Forum

+10

+20

Silver

Heating

Sign-Up

Prospect

+ SMS

Supporter

+ Survey

2. Week

Checker

3. Week

Contributor

4. Week

Sustainer

Levels more energy
related, e.g. tree or (

PBL Triad

- personalized
> friend-related

- badge stencil

- weighted poin
knowledge < c

How will weSPOT ?

* Interest and quality in science through inquiry.
* Inquiry learning into today's and the future school environment and everyday living.
* Smart inquiry support mechanism and a diagnostic instrument evaluated in 9 domains and test-beds.
* Build open-source tools and disseminate them into the existing LMS solutions as also via social media.

Thanks.

Questions please.